AUGUST 29, 1955

NEWS ISSUE

Electrical World

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A McGRAW-HILL PUBLICATION

Substation Wins Neighbors' Approval

Transformers are set in pits and surrounded by evergreens

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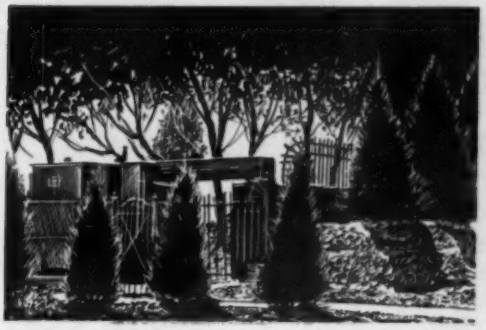

System Operation Center Pays Off

It helps in economic scheduling and loading of generators

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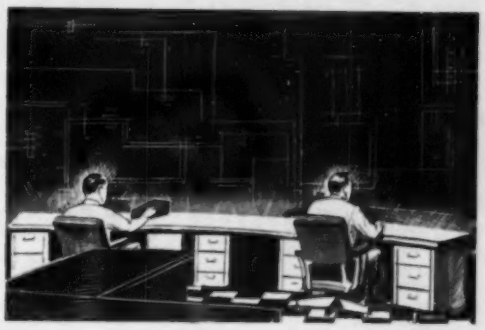

Leaving Services 'Hot' Saves $52,000

When customers move, meter is read; but lines are left connected

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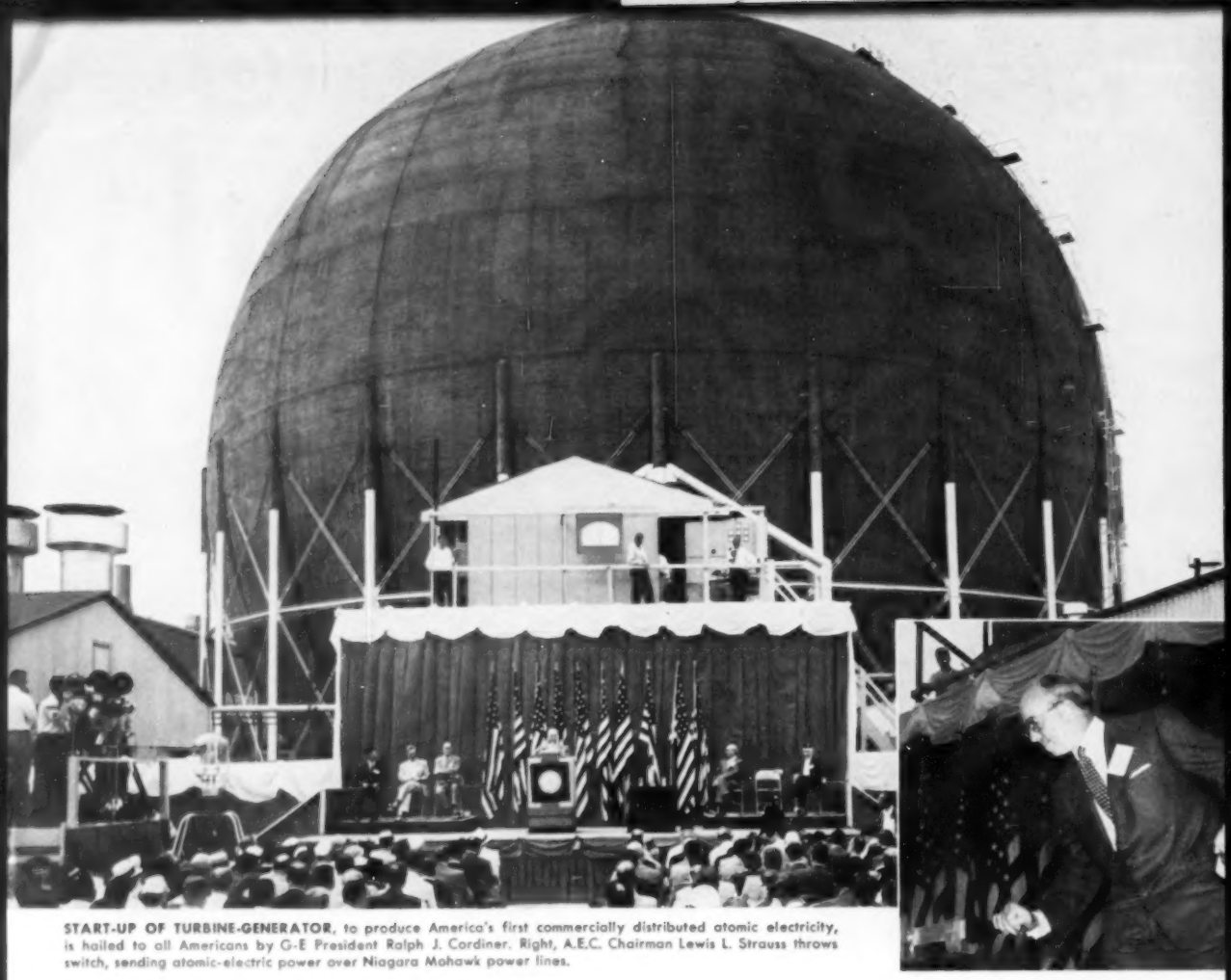
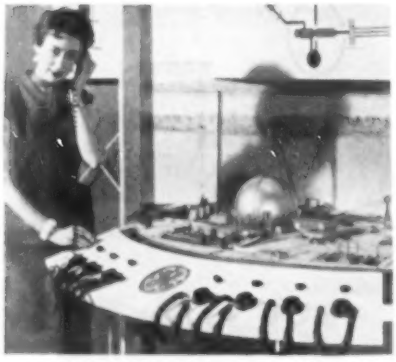


START-UP OF TURBINE-GENERATOR, to produce America's first commercially distributed atomic electricity, is hailed to all Americans by G-E President Ralph J. Cordiner. Right, A.E.C. Chairman Lewis L. Strauss throws switch, sending atomic-electric power over Niagara Mohawk power lines.

World's first commercially distributed atomic electric power

Gives public first glimpse of atomic future



ATOMS FOR PEACE conference, Aug. 8-20, found General Electric scientists ready to pool their knowledge in Atomic energy. At Geneva, G-E model of the Commonwealth Edison dual-cycle power plant showed the world how far American business firms have progressed in atomic energy.

The American people got a preview of what is to come in electric utility operations when, for the first time, commercially available atomic-electric power was generated by General Electric and released by the Atomic Energy Commission over the lines of the Niagara Mohawk Power Corporation on July 18, at West Milton, N. Y.

In co-operation with the A.E.C., G.E. is operating the 10,000-kw station at its own expense. Steam is supplied by the A.E.C.'s Submarine Intermediate Reactor prototype, constructed by G.E. for the Navy's Submarine *Seawolf*.

PUBLIC SEES PROGRESS

West Milton offers a graphic demonstration to the public that tremendous progress already has been made in harnessing the atom for peacetime employment. It also spotlights the significant role private industry can play in atomic development.

At G.E., over 13,000 are now actively engaged in projects for military and peacetime atom progress. Work is under way to help Commonwealth Edison fulfill plans for a 180,000-kw atomic-powered generating station, largest all-nuclear plant yet scheduled. It is in such work by companies ready to risk major investments that America's leadership in atomic progress can be sustained. For more information, contact your nearest G-E Apparatus Sales Office. General Electric Company, Schenectady 5, N. Y. 303-202

MORE POWER TO AMERICA

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ELECTRICAL WORLD

Published weekly by McGraw-Hill Publishing Co., Inc., Executive, Editorial, and Advertising Offices: **McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y.** Publication Office, 99-129 North Broadway, Albany 1, N. Y.

Donald C. McGraw, President; Paul Montgomery, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Nelson Bond, Executive Vice President, Publications Division; Ralph B. Smith, Vice President and Editorial Director; Joseph H. Allen, Vice President and Advertising Director; J. E. Blackburn, Jr., Vice President and Circulation Director.

Subscriptions: Address correspondence to Electrical World—Subscription Service, 99-129 North Broadway, Albany 1, N. Y. or 330 W. 42nd St., New York 36, N. Y. Allow one month for change of address.

Subscriptions are solicited only from executive, supervisory, and engineering personnel in electric utilities, manufacturing companies, and related fields. Position and company connection must be indicated on subscription orders.

Single copies 35¢. For the United States and possessions and Canada, $6 a year, $9 for two years, $12 for three years. Other Western Hemisphere, and the Philippines, $15 for one year, $25 for two years, $30 for three years. All other countries, $25 for one year, $40 for two years, $50 for three years. Entered as second-class matter at the Post Office at Albany, N. Y. Printed in USA. Copyright 1955 by McGraw-Hill Publishing Company, Inc. Permission required to reproduce any of contents.

Electrical World

Published for 81 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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COMING NEXT WEEK—The industry's latest mystery is the reason for the excessive number of lightning outages on EHV lines. You'll be interested in the investigation now underway.

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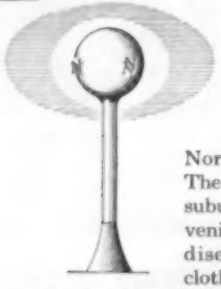
... the choice of leaders in industry

These metal clad substations are installed in the basement of the Hudson Building for 4800—208Y/120 volt lighting distribution.



world's most power-full shopping center

Northland Center development of The J. L. Hudson Company for suburban Detroit, 161 acres of convenience, offers shoppers merchandise and services ranging from clothing to food, furnishings, drugs, dry cleaning, barbering and banking.

The branch department store and some 80 other Northland Center stores are tremendous consumers of electric power. So great is Northland's demand for electricity that the Detroit Edison Company has built a substation there large enough to supply the electrical needs of 25,000 homes.

Eleven double-ended substations, rated from 1000 to 2000 kva, are required to distribute this electric power. Each of these I.T.E. Unit Substations is equipped with two Wagner dry-type transformers.

Wagner Transformers play an important part in supplying power to many major businesses and industries. You'll find them where, as at Northland, only the finest equipment has been installed.

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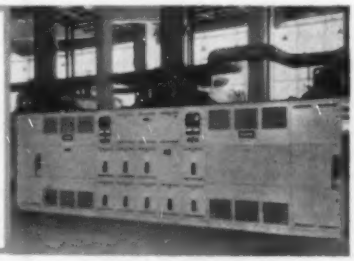

Unit Substation installed in Utility House for 4800—480 volt power distribution.

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EDITORIALS

Industry Benefits from Geneva

The atoms-for-peace conference held in Geneva this month promises to bring a number of benefits to U. S. industry. Some will be concrete and direct such as orders taken for export of nuclear equipment or knowledge for immediate application in manufacturing. Some will be less direct such as the increased stature American research and industry gain because of their showing at Geneva.

Towering above these is the general relaxation of secrecy that has surrounded the peaceful atom. The international technical meeting provided both the atmosphere and the incentive for freer exchange of information between nations. Engineers and scientists could not afford to attend such a conference merely for the purpose of recounting experiences and formulas already published.

As head of the U. S. delegation, Lewis L. Strauss set the tone and the pace in this regard. The Atomic Energy Commission chairman went further than was generally expected in announcing the prices at which the U. S. would make available nuclear fuel material. His brief discussion of the U. S. effort in harnessing the fusion reaction for peaceful purposes was more revealing than anything he had previously said in public on that score. In fact he has in the past actively sought to discourage discussion and speculation on the controlled use of the hydrogen process for power generation.

Even the Russians, who until then had kept their nuclear information under tight wraps, were willing to give other scientists a peek at some of their activities. Whether or not these do contribute to the advance of nuclear technology, they do indicate the direction in which the Russians are working.

Papers presented or made available at formal sessions provide volumes of data, much not previously available. Formal discussions at the conference helped, too, in gaining and trading information.

Corridor discussions, according to our reports, have played nearly as important role at Geneva as they do at technical meetings in this country. Here men were able to gain information and background that does not come in formal papers.

By enabling and encouraging the free flow of information, the Geneva conclave has made a real contribution. Its example is sure to have a favorable effect on the further relaxation of secrecy in this country. For electric utilities and other industries, this is the major benefit to come from Geneva.

Victory at Hells Canyon

It comes as no surprise that the Federal Power Commission in its wisdom and knowledge has licensed Idaho Power Co to develop the Hells Canyon reach of the Snake River in Idaho. The commission's technical staff after comparing the Idaho Power proposal with a federal high dam proposal recommended in favor of the company. The commission examiner, who conducted hearings on development of the site for more than a year, concurred with the staff although he would have licensed but one of the three dams proposed by the company.

And now the commission, relying on the accumulated evidence and the arguments of all sides, put its unanimous endorsement on the electric company development. This unanimity adds to the weight of the opinion and makes it more difficult for opponents of the decision to carry forward their opposition.

Assuming there have been no serious procedural errors in these long and complicated proceedings, the courts are almost certain to uphold the FPC decision. Courts in the past have never questioned FPC's technical competence to carry out the authority it exercises. Indeed, the Supreme Court in the Phillips Petroleum case greatly expanded FPC's regulatory authority into an area not previously claimed by the commission.

It is always posaible that Congress, which delegated original authority to FPC, may want to withdraw it in this or in all instances. Several sessions of Congress, including the one recently adjourned, could have done this by authorizing federal development of Hells Canyon. It seems to us that the next session of Congress will have two additional reasons for supporting the FPC decision. First, the independent staff report offers compelling technical and economic reasons for the company development. Second a majority of Congress will not want to pull the rug from under a semi-judicial agency after a decision is made. Legislation along this line would have some of the trappings of an ex-post facto law which the constitution banned 166 years ago.

Hurricane Alert

Along the hurricane paths these days go out warnings and advice from the Red Cross, mayors, and other public officials. Among these are the admonition to all: "Keep away from fallen wires. . . . They can kill."

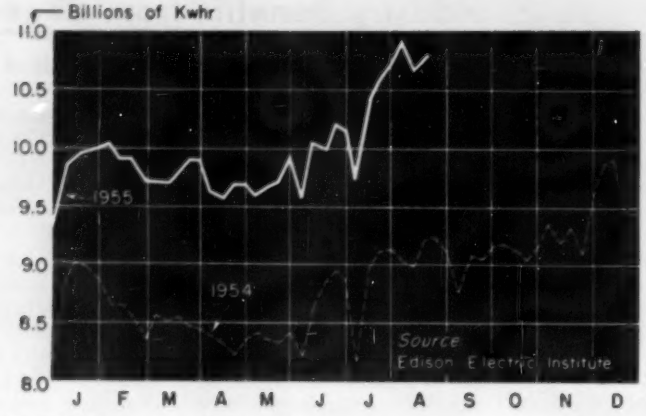
Newspapers in the New York metropolitan area have carried the warning often and prominently in their news columns. Utilities have helped in getting the warning across. But it can't be repeated too often. The saving of a single life more than compensates for the effort.

"Don't touch downed wires . . . call your utility," should become a reflex action of every citizen young and old. Electric utilities will want to use every means of communication to get this message across especially when hurricanes and storms threaten.

It belongs in every news story of an approaching storm. It might also be carried in newspaper ads and on bus and train cards. Consider it for radio and television spots.

The life you save may be that of your customer.

ELECTRICAL WEEK



OUTPUT

Week Ended Aug. 20
10,812,000,000 Kwhr
Up 17.4%

Atomic Energy Commission requirements — 947,000,000 kwhr (Electrical World estimate). Excluding AEC, output increase was 12.4%

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Aug. 20	+17.4	+6.5	+17.1	+30.3	+9.6	+22.7	−1.5	+8.7	+13.1	+13.1
Aug. 13	+19.3	+9.9	+13.2	+33.6	+12.4	+23.4	+8.4	+6.0	+13.7	+13.2
Aug. 6	+20.6	+13.2	+17.2	+38.3	+20.3	+21.7	+8.1	+5.6	+12.4	+10.1

Seasonally Adjusted Index 204.2 Week Ago 203.0 Year Ago 174.4

The Issue's Highlights: Flash-floods in seven Northeastern states inflict heavy utility damage . . . Senate unit plans investigation of Ebasco's role in proxy fight on proposed merger of Puget Sound P&L and Washington WP . . . AEC indicates it will join in insuring private nuclear power installations only as last resort . . . United Nations' atoms-for-peace conference points up possibility of competitive nuclear power in few years . . . AIEE's Pacific General Meeting accents operating practices covering transformer loading, switching of autotransformers . . . Nation's industrial map is changing. Industry is leaving East and Midwest and going South and West.

Memphis has hired Burns & Roe, Inc, as consulting engineers for construction of its proposed $100 million municipal power plant. T. H. Allen, president of city's Utility Division, said Burns & Roe would receive as fees slightly less than 3% of total cost of construction based on anticipated $100 million cost.

For the first time in Washington state citizens will vote this fall on whether or not to dissolve a PUD. Stevens County residents will decide whether to sell out to Washington WP, or, whether the PUD should buy WWP's facilities in the county. This is the first time a PUD has agreed to let voters decide. WWP would bid about $2.8 million for PUD properties and PUD would offer about $3.1 million for WWP's facilities.

Another indication of what socialized industry means comes from Britain. Calling upon the government to investigate monopolistic buying practices of nationalized industries, Charles Orr Stanley, head of Pye Electrical Co said: "We the Pye Co, with young and vigorous subsidiaries, have felt the cold breath of a nationalized government on a newcomer. He has as little a chance of breaking in with his products as has a snowflake of existing in hell."

Alabama Power Co has acquired Liddle Power of Camden, Ala. . . . Directors of Pacific P&L and Western Public Service have approved merger plans. Western PS stockholders will receive four shares of Pacific P&L common stock for each common share of Western. Pacific P&L stockholders will vote on merger October 18.

Pacific Northwest public power advocates for regional generation and transmission corporation estimate Washington, Idaho, Oregon, and Montana will require 100-million kw of generating capacity by year 2000 and that two-thirds of this must come from nuclear plants . . . Colorado Gov Edwin C. Johnson is throwing his weight behind $180,000, four-state drive to put over $1.5-billion Upper Colorado River project.

NEWS OF THE INDUSTRY BRIEFLY TOLD

Off the Washington Wire: Number of international agreements involving sale of complete U. S.-made nuclear power plants will be presented to Congress next session, according to Edward Diamond, deputy general counsel of AEC . . . Chairman Clinton P. Anderson of Joint Atomic Energy Committee has indicated his willingness to vote more money if necessary to expand U. S. program for harnessing thermonuclear process for power generation.

Westinghouse has announced election of Gwilym A. Price, president since 1946, to combined office of chairman and president. Chairmanship has been vacant since 1951. Mark W. Cresap, Jr, was elected executive vice president and deputy chief executive officer. Lantham E. Osborne was elected vice chairman, and John K. Hodnette, formerly vice president in charge of apparatus products division, vice president-general manager. A. C. Monteith, vice president in charge of engineering and research has taken Hodnette's vacant post. Replacing Monteith is Dr John A. Hutcheson who was director of Westinghouse Research Laboratories.

Future Financing: Tampa Electric will offer 197,532 common shares to its stockholders on 1-for-10 basis, record Sept. 20 to expire Oct. 6 . . . Delaware P&L has arranged $12-million revolving credit with seven commercial banks.

California joint State Senate-Assembly Committee on water problems has selected Bechtel Corp of San Francisco to review state engineer's report recommending construction by state of proposed $1.5-billion Feather River Project . . . Damage from land subsidence—an expensive item for utilities in California—has prompted a recommendation for a three-year study of the problem. Inter-agency Committee on Land Subsidence, consisting of representatives of Reclamation Bureau, Corps of Engineers, and Stanford and California Universities, is urging integrated study by public and private agencies at cost of about $955,000.

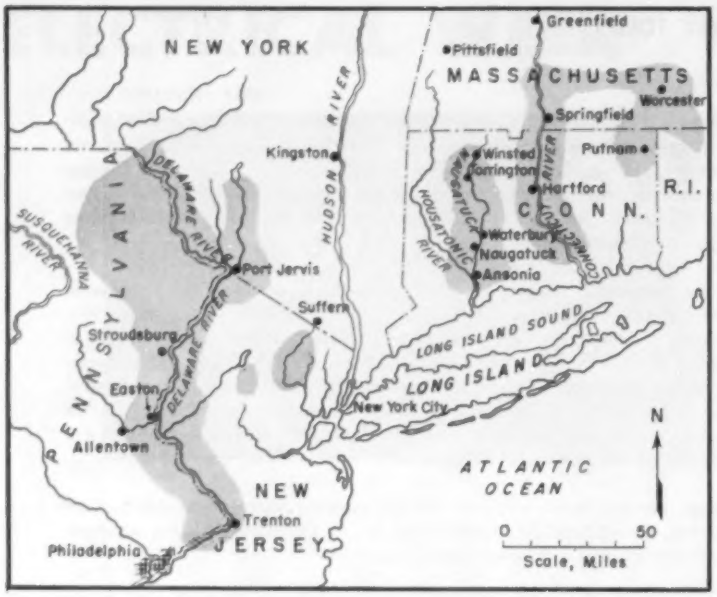
"Return Allowed in Public Utility Rates Cases, 1915-1954," Arthur Anderson Co's annual study of rate cases, has just been issued. For copy write the company, 67 Broad St, New York 4 . . . Rep Earl Chudoff (D-Pa.), has scheduled series of field hearings on federal marketing practices during next several weeks for his House subcommittee on power policy.

ABOUT PEOPLE IN THE INDUSTRY

Back from Geneva atoms-for-peace conference last week, AEC Chairman Lewis L. Strauss voiced concern at rate at which U. S. is training engineers and scientists. "We are not developing young scientists and engineers commensurate with the demands that the atomic age will make," he said. He had gained the impression at Geneva, he added, that the Russians were "bending very great effort to the training of scientists—more than we." He noted that rewards for scientists were greater in other nations than in U. S.

William M. McInnes, president, Tampa Electric, has announced signing 20-year contract with Nashville Coal Co for 750,000 tons a year of West Kentucky coal for Tampa's new Black Point Plant. Company thus becomes only major Florida utility to use coal instead of oil. McInnes noted that oil price fluctuates; that England's adoption of oil to fuel power plants might make it scarcer. By switching to coal, he added, company hopes to avoid cost increase in future. Coal will come in by barge across Gulf.

More News About People page 36



More than 100,000 customers out of service; estimated damage runs into billions of dollars in shaded areas of map as . . .

Flash Floods Cripple Northeast

Flash floods, from swollen creeks and rivers, struck across the Northeastern states as Hurricane Diane poured heavy rains on the area. Total damage mounted into the billions of dollars, and some 100,000 electric customers were reported knocked out of service.

Hardest hit by the raging floods were utilities in Pennsylvania and Connecticut. Severe but less extensive utility damage was reported in Massachusetts, Rhode Island, and New Jersey. All were declared major disaster areas by President Eisenhower. Upper New York also suffered damage from heavy rainfall.

Damage in Pennsylvania

Two Pennsylvania utilities reported about 50,000 customers washed out of service by floods and heavy rains which caused extensive damage to poles, transformers, and substations. Greatest damage occurred at Stroudsburg and Easton on the swollen Delaware River with a 43 ft flood crest and 13 in. of rain recorded.

Pennsylvania Power & Light Co lost 34,593 customers in two divisions alone. Scranton, as EW went to press, was still unable to provide complete estimates of damages and outages in its area. On PP&L system, some 26 miles of transmission and 68 miles of distribution lines were lost in the flood. Struck hard were the Poconos and Anthracite regions where Broadhead Creek and the Schuylkill, Lehigh, and Delaware rivers flooded.

Metropolitan Edison Co lost 15,000 customers at flood peak. All but 800, about half completely destroyed, were back in service within three to four days. Service to Stroudsburg was restored by a portable substation and to East Stroudsburg by jumpering its flooded substation within 24 hours. The utility estimated 425 poles washed out, 40 distribution transformers lost, one 600 kva substation bank destroyed, and seven substations flooded with one to be abandoned because of its low-ground location.

About 54 inches of water flooded the first floor of the utility's Easton office. To assist in restoring service, Bean, Inc, a general contracting firm, turned its headquarters outside Easton over to the utility.

Entire Towns Out in Connecticut

From Connecticut came reports of entire towns knocked out of service with severe damage to utility installations.

Connecticut Power Co at Hartford stated that 17,000 customers had been whipped out of service with complete outages at Torrington and Farmington. In Torrington the flood washed away streets, complicating the task of replacing poles downed in the deluge from Naugatuck River.

The incoming substation at Torrington was expected to be out of service for about a week before equipment could be dried and outgoing lines energized. One station was completely washed away. The utility's load was impaired with factories and mills smashed out of operation. Two steel transmission towers were lost, and a line spanning the Farmington River on 50-ft poles washed out.

Repair Work Hampered

The velocity, rather than the height, of the flood waters accounted for most of the damage, utility spokesmen said. Washouts, debris, and communications breakdowns, they added, complicated the task of repairing the damage.

Housatonic Public Service Co in Derby reported two major substations and a generating station knocked out of service. Rainfall in the area totaled 13 in. Outages in the Derby-Ansonia area topped 15,000, but damage estimates were not available. A company official stated, "We never had anything like this before."

Connecticut Light & Power Co was unable to give complete damage figures. But its Waterbury service building was flooded to its second floor. This city and others in lower Naugatuck Valley suffered severely.

New England flood damage was not as heavy as that in Connecticut and Pennsylvania.

New England Electric System estimated total flood losses between $350,000 and $500,000. Overhead distribution facilities fared well, and 12,000 of about 735,000 customers were out of service.

A NEES subsidiary, Worcester County Electric Co, was forced to shut down its 88,571-kw steam plant near Webster Square when steam auxiliaries became flooded. Its load was carried by transmission from hydro plants in the system. Harder hit was the Charlton substation which was wrecked by flooding.

Boston Edison Co had 30,000 of 450,000 customers out of power for only a matter of hours. Damage to substations and transmission and distribution lines was negligible.

Western Massachusetts Electric Co felt the principal storm effects in the Westfield River Valley where several towns were out of power until a 22-kv subtransmission line was restored. A landslide shut down the 33,000-kw Cobble Mountain hydro plant, but no structural or equipment damage appeared permanent.

Blackstone Valley Gas & Electric Co of Pawtucket, R. I., escaped heavy plant and line damage and held maximum power interruptions to 20 minutes.

Rampaging flood waters wrecked the Charlton Substation of Worcester County Electric Co, subsidiary of New England Electric System, Boston

In New York State, Rockland Light & Power Co lost 5,200 customers from floods and rains in three days. Substations were all in service except one isolated by a 34-kv pole washout.

New Jersey Power & Light Co had less than 4,000 customers out when the utility deliberately cut several lines. One substation was flooded out of service, but was replaced by a mobile unit. The Gilbert generating station of 121,000 kw was forced to shut down to protect the station's equipment when the flood level approached 36 ft.

Public Service Electric & Gas Co escaped serious trouble with only 600 customers knocked out of service.

Senators Investigate Ebasco's Merger Role

As Democrats continue their free-wheeling hunt for political issues for the 1956 political campaign they are broadening their interest in the power field. Latest target is Ebasco Services, Inc, which Sen Joseph C. O'Mahoney (D-Wyo.) will make the subject of an investigation.

O'Mahoney plans to head a unit which will investigate what he claims was Ebasco's part in a proxy fight concerning a proposed merger between Puget Sound Power & Light Co and Washington Water Power Co.

Recently O'Mahoney sent two investigators to Ebasco's New York offices, armed with subpoenas for the firm's records. With these, he plans to open hearings within a matter of weeks.

Meanwhile, O'Mahoney and his two public power colleagues, Sens Estes Kefauver (D-Tenn.) and William Langer (R-N. D.) continued their attacks on high Administration officials for their roles in the now cancelled Dixon-Yates power contract.

These three signed the report covering months of scandal digging which preceded cancellation of the contract. They are going to call Budget Director Rowland Hughes, Atomic Energy Commission Chairman Lewis Strauss, former Securities and Exchange Commission Chairman Ralph Demmler, Tennessee Valley Authority Chairman Herbert Vogel, and Federal Power Commission Chairman Jerome Kuykendall for further questioning.

Senators' Accusations

Here are the things they accused some of these and other administration officials of doing:

- Using "sly and clever" tactics to conceal details of negotiations leading up to the contract, which called for construction by Dixon-Yates of a 650,000-kw steam plant at West Memphis, Ark.
- "Misuse of independent offices, suppression, concealment, half-truths and misrepresentation . . . as chain consequences, each misstep leading to the next."
- "Usurpation of congressional responsibilities and functions . . . a deliberate effort to reverse power policy in the Tennessee Valley by devious, indirect, and improper administrative practices."

Particularly selected for criticism were Hughes, Presidential Assistant Sherman Adams, AEC General Manager K. E. Fields, and Demmler's successor, J. Sinclair Armstrong who became SEC head two months ago.

The three conducted an unusual investigation this session. They sat as a task-force of a Senate subcommittee. Their interim report was, therefore, submitted to the subcommittee, which is headed by Sen Harley Kilgore (D-W. Va.). It has no legal effect on the

(*Continued on next page*)

Senators Investigate

(*Continued from previous page*)

basis of the investigation. The report recommended:

- Amendment of the conflict-of-interests statute to indicate clearly that consultants and dollar-a-year men in government may face "successful prosecution" when they participate in their official capacities in matters in which they have a direct or indirect interest.

This suggestion grows out of the Senators' investigation of the part in the Dixon-Yates contract played by Adolphe Wenzell, who was a vice president of the First Boston Corp, New York investment banking firm.

- Consideration by Congressional committees of a requirement that officials of the executive branch submit written, signed statements when they wish to plead privilege against testimony under an executive order and want to withhold certain information from Congress.
- That the Joint Committee on Atomic Energy take steps to insure full and complete independence of the Atomic Energy Commission. The probers did not like what they considered interference by Budget Bureau and other highly placed Administration officials in AEC's business.

AEC Releases Study Prepared by Utility Team

The Atomic Energy Commission recently released a study on atomic energy needs in Europe which was prepared by two utility officials for the International Cooperation Administration, formerly Foreign Operations Administration.

Harry I. Miller, vice president of Wisconsin Public Service Corp, and F. Douglas Campbell, assistant to the president of Detroit Edison Co, made the study which was not declassified in time to be presented at the atoms-for-peace conference recently held at Geneva.

Their research revealed that atomic energy needs in Europe will be on the increase over the next few decades. However, the study disclosed, atomic energy power plants will supplement rather than replace hydro and steam plants as present energy sources are exhausted.

AEC Declines Insurance Aid

. . . for private atom installations, except as last resort; declares 'industry' must prepare to meet the hazards problem involved

Top Atomic Energy Commission attorneys have indicated strongly that the government will participate in insuring private nuclear installations only as a last resort. They made it clear that prospective atomic plant owners and the insurance industry must come up with concrete figures on the amounts of liability needed and the limits available.

The officials were Harold L. Price, director of AEC's Division of Civilian Application, which handles licensing and regulation of private plants, and Clark C. Vogel, AEC deputy counsel.

In a speech before the Public Utility Law Section of the American Bar Association in Philadelphia, Price pointed out that "industry" must be prepared to meet the hazards problem.

"Thus," Price continued, "the applicant for a reactor license must satisfy the Commission that the location of his proposed reactor, its design and containment, his operating procedures and processes, his fail-safe protective devices, and other technical specifications give reasonable assurance that the health and safety of the public will not be endangered."

Price said the insurance problem must be solved. "Until it is solved," he said, "it may act as a deterrent to the fullest possible industrial participation in the atomic energy program."

As a member of a panel of the Federation of Insurance Counsel that met in Washington, Vogel said: "AEC has no desire to undertake an insurance business and will seek authority to do so only if excess coverage can be justified on the basis of a real need and if the lack of such coverage proves to be an actual deterrent to participation and progress . . ."

Vogel made it clear that justification of need for coverage, over and above the amounts the insurance companies themselves estimate they can underwrite, is the applicant's job.

Geneva Atoms Meet Spotlights Power

Consideration of nuclear energy as a possible, and not too distant, source of economical power retained the spotlight throughout most of the United Nation's atoms-for-peace conference recently adjourned in Geneva.

The 1,200 delegates generally agreed that information brought to light at the conference indicated most nations, now working with the atom, would be producing nuclear power at a price of about seven mills per kwhr in a few years. Such a price would be competitive in many nations including parts of the United States where cost of conventional power averages four to seven mills.

Highlight of the two-week conference was the announcement of plans, now underway, to harness power produced by the hydrogen bomb principle. In order to do so, atoms of a lighter element must be transformed into those of heavier ones. The H-bomb process, known as fusion, requires intense heat and has been regarded impracticable for commercial use.

The U. S., however, announced that it had a large-scale program underway to harness hydrogen energy for controlled power generation.

Another high spot of the conference was hit when the British disclosed that they had developed an experimental breeder reactor which produces twice as much nuclear fuel as it consumes. In all other reactors of the type, the highest fuel production rate so far obtained has been 10% of the original fuel charge. The British expressed some doubt, however, that the same 2-1 rate of return would exist in a large-scale commercial reactor.

The nations, in dropping their security barriers at the conference, demonstrated that little had been gained by observing a policy of secrecy in their atomic work. Most major powers had achieved about the same stage of development; secrecy had only retarded the advance with unnecessary duplication of effort. The nations adjourned with plans to meet again in a year or two.

ten million jerks a year...

can't shake these connections loose

The problem was simple—but the solution was ingenious.

To dry and sift clay in a single operation, a major Southern brick manufacturing company conceived the idea of passing current through the sifting screen itself—making it a giant resistance-heated sieve.

The electrical problem was connections that could withstand the 70 jerks each minute between the vibrating screen and the fixed bus bar.

Solution: Sturdy VVA clamp connectors providing tight, reliable, re-usable connections carrying 2,500 amperes at 45 volts between bus bar and strap. Their service record on this job: 5 years without a single failure!

Better electrical connections can help speed your production, improve quality, cut costs. Call on Burndy—Norwalk, Connect., Toronto, Canada. *Factories:* New York, Calif., Toronto. *Export:* Philips Export Company.

BURNDY VVA: V-BOLT TYPE, ENGINEERED TO HOLD TIGHT UNDER CONTINUOUS VIBRATION. RE-USABLE.

It's good business to connect with...

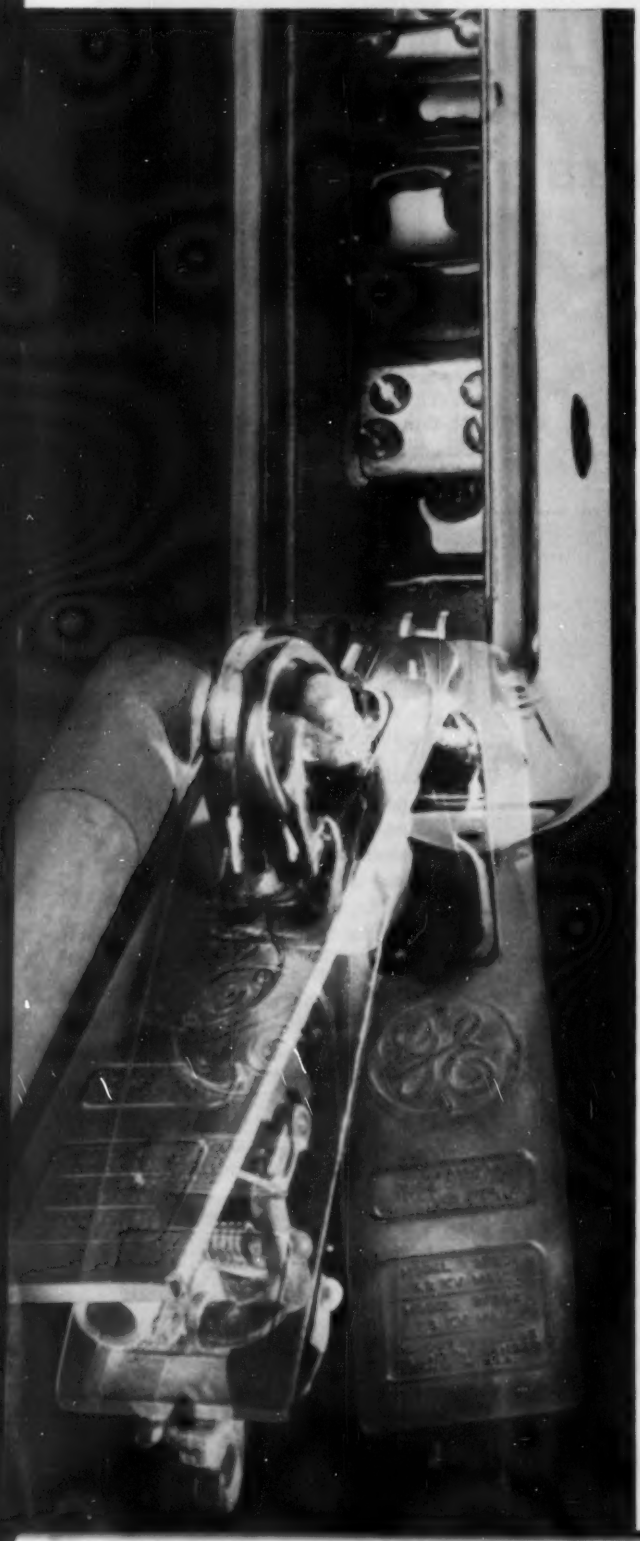
BURNDY

54-22

...FIRST name in electrical connectors; tools; methods

old

Door could wiggle, swing around, sometimes even fall off the stick. Dangerous and aggravating.



new

Stick fits securely in door socket. Door stays steady. No juggling, faster replacement.

ALL-NEW ENCLOSED FUSE CUTOUTS

now...

socket-grip door handle on new G-E fuse cutout ends switchstick juggling

Now every door on G.E.'s new cutout line has a new design idea—a socket-grip handle that fits snugly over the head of a conventional switchstick for easy door removal or replacement.

It's a G.E. "first". Your lineman shoves the stick in the door socket, lifts up to the housing, and hooks the door hinge on. He hits it right—the first time. The socket-grip door handle also provides a secure hold for a gloved hand.

DOORS ON G.E.'S NEW CUTOUTS have plenty of other advantages—they're easier to connect, easier to fuse, easier to close and open. Disconnect blades are hinged, and can't fall to the ground accidentally. With the unique G-E convertible door, cutouts are easily converted in seconds from indicating non-dropout to dropout.

4 DOORS—1 HOUSING—that's all you need with G.E.'s new simplified fuse cutout line. You get all cutout functions—indicating-dropout, indicating-non-dropout, and disconnect. Two current ratings are available—50 amp. and 100 amp., and two voltage ratings—5.2 and 7.8 kv.

ENGINEERS AND LINEMEN WILL LIKE these other new features in the G-E cutout line: plastic-to-metal latching that prevents door "freezing" . . . the rugged hanger support that withstands the roughest shocks encountered in service . . . flip-out semaphore that gives easy-to-see evidence of a blown fuse. These features are now standard in all new G-E cutouts. Learn all about it—write for Bulletin GEA-6208, General Electric Company, Section 433-10, Schenectady 5, N. Y.

ENGINEERS AND LINEMEN AGREE

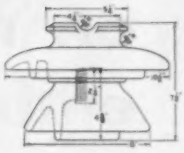
The completely new line of G-E fuse cutouts has more of the features they prefer. There's good reason, too—the new design incorporates suggestions made by utility engineers and linemen to G-E sales engineers and specialists.

Progress Is Our Most Important Product

GENERAL ELECTRIC

America's Finest!

VICTOR NO. 245
TRANSMISSION
PINTYPE
(Radio-Freed or Plain)



VICTOR
Purified Porcelain
Transmission Pintypes

VICTOR Transmission Pintypes are America's finest because VICTOR "Know-How" has endowed them with extra long life under even the most severe conditions of service. Made of VICTOR *Purified* Porcelain—they are the finest insulators skilled craftsmen and modern research can produce. Victor Transmission Pintypes are designed with thick, rugged, rounded corrugations for maximum strength and resistance to impact. They have large radius top and side-wire grooves to permit use of new larger conductors, and smooth hard glaze that protects against weathering and contamination. Each is thoroughly inspected at every stage of manufacture. You just can't buy a better insulator!

FEATURES

1. **UNEQUALLED STRENGTH,** thanks to *Purified* Porcelain—finest insulator porcelain ever made!
2. **CUSHION-COATED JOINTS**—special coating at joining surfaces absorbs thermal variations and mechanical shock.
3. **THICK, RUGGED CROSS-SECTION** plus rounded edges give maximum strength, protection against impact, cut replacement costs.
4. **LARGER RADIUS TOP AND SIDE WIRE GROOVES** permit the use of new, larger conductors.
5. **SCIENTIFICALLY COMPOUNDED GLAZE** gives maximum strength and a smooth, self-cleaning surface.
6. **CONTROLLED TESTING AND PROCESSING OF CEMENT** assure highest bond strength at assembly joints.

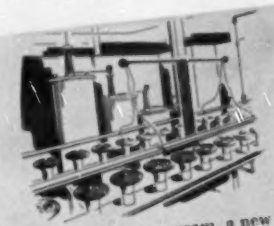
SPECIFICATIONS

60 cycle dry flashover	125 KV
60 cycle wet flashover	80 KV
Positive impulse flashover*	200 KV
Negative impulse flashover*	265 KV
Dry arcing distance	9⅛"
Leakage distance	21"
Pinhole diameter	1⅜"
Rec. pin height	8"
Cantilever strength	3000 lbs.
RNI (plain)	16,000 microvolts
RNI (radio-freed)	200 microvolts
1000 KC at applied	30 KV

*Crest KV. 1½ x 40 microsecond wave Critical Value.

For the full facts on Victor "Know-How," write for "The Story of Victor and Purified Porcelain." For engineering data on Victor insulators, write for Bulletin No. 4.

NEWS FROM VICTOR



As part of its continuing modernization program, a new 60 cycle, 225 KV continuous flashover tester has been installed in the VICTOR plant. By means of this new equipment, the operator is able to attain more accurately regulated 60 cycle flashover to a definite time standard, thus attaining maximum effectiveness in conducting routine flashover tests.

SPECIFY VICTOR
Purified Porcelain
Pintypes

VICTOR INSULATORS DIVISION
I-T-E CIRCUIT BREAKER CO.
VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains
Spools • Switch and Bus Insulators • Custom Designed Porcelain
Insulator Hardware

AIEE'S PRES M. D. HOOVEN AND FRIENDS AT PACIFIC GENERAL MEETING

AIEE Pacific Meet Spotlights

. . . responsibility of engineers in next generation and operating practices of transformer loading, autotransformer switching

The responsibility of engineers, in general, and operating practices relating to transformers, specifically, retained the focus for at least half of the American Institute of Electrical Engineers' three-day Pacific General Meeting in Butte, Mont.

Other papers dealing with equipment design, application, and testing were also presented to the 250 Institute members attending the meeting.

The year ahead for the Institute was previewed by AIEE president Morris D. Hooven, Public Service Electric & Gas Corp. Pointing out that the 700,000 engineers and physical scientists dwarf the number of professional men engaged in the ministry, law, and medicine, Hooven declared that the intellectual leadership of the next generation must come from the ranks of engineers. He estimated that 30-40,000 engineering graduates will be needed by the profession.

AIEE's two-fold job is to absorb all electrical graduates into the organized profession and to continue to promote unity among the profession. Hooven added that results of a recent survey showed that Institute members feel advancement of knowledge should remain the major objective.

Leading off the engineering meetings, Arthur Klopfenstein, Southern California Edison Co, proposed that transformers be loaded to obtain the minimum annual cost per kva. He demonstrated a method for computing annual depreciation cost due to thermal aging for units serving a coastal residential load and an inland irrigation pumping load. Klopfenstein added that analysis of more data from field tests and observations relating aging to loadnig are needed to confirm aging predictions.

Interruption of autotransformer exciting currents by an air break disconnect switch from a stable voltage source presents no hazard to equipment or personnel, concluded M. W. Anderson, Seattle City Light. He described interruptions made on the high side of a bank rated 9/20/150 Mva, 220/115.5 kv, wye-connected with solid grounding and a 13.2-kv delta-connected tertiary. The air break switch, rated 1,200 amp at 196/230 kv, was a triple-pole, single-throw, gang-operated unit without arcing horns.

Automatic load shedding seems to be increasing gradually, although most systems have not yet found a need for the practice. This was reported by a project committee of the AIEE relay committee based on a survey of 52 companies. The frequency relay is the most widely used for load shedding, but the committee pointed out that a fast, dependable rate-of-change-of-frequency relay would at least find partial use.

On the subject of system splitting, Cort Lowerison, Southern California Edison, said they can separate the 220-kv system into four parts by switching at three locations. To prevent false tripping, overcurrent relays and frequency slip relays are coupled at the sensing stations.

Pacific Coast Experience

Automatic reclosing relays have proven their value in maintaining continuous service, concluded the Pacific Coast relay subcommittee. In a study of 1,852 faults, automatic reclosing relays permitted 79.2% successful reclosures on transmission lines and 81.22% on distribution. It appears that the circuit must be dead at least 12 cycles to assure successful reclosing.

On their 230-kv lines, said A. W. Adams, Bonneville Power Administration, single-shot reclosing with no synchronism check is working satisfactorily. In 41 outages, 36 reclosed satisfactorily at both ends during the past summer. Adams added that reclosing has prevented the good possibility of system breakup in some instances. M. A. Bostwick, Portland General Electric Co, said the use of simple relays with a minimum of auxiliary devices and the elimination of synchronism checking would provide the best automatic reclosing.

Reclamation's 230-kv System

In discussion following the paper by T. M. Austin, Bureau of Reclamation, describing the Bureau's 230-kv system in North Dakota, Holland Farr, USBR, noted that new Bureau lines have transpositions made only in the substations. Deadend structures are used only where required, and not every so often in the line. Concrete footings are used to combat electrolytic action in alkaline soils. Farr added that probably all new two-circuit Bureau lines will have one, not two, overhead ground wires.

By setting equipment in pits 3½ ft below ground level . . .

. . . concealing front with a bank, fence, and evergreens . . .

. . . Union Electric makes substation harmonize with neighborhood

Substation Wins Neighbors' Approval

R. W. SCHOETKER, Senior Substation Engineer, and
D. T. MAUL, Electrical Engineer, Union Electric Co of Missouri, St. Louis, Mo.

Jackson substation, situated where residential property values are high and close to the dividing line betwen two private St. Louis subdivisions, meets system and load requirements, neighborhood acceptance, and the approval of property owners in the adjacent area. But attaining these objectives posed for Union Electric Co of Missouri a real dilemma.

The load was growing where the customers' sensitivity to neighborhood appearance was a formidable obstacle to the introduction of the additional facilities to serve them. Trustees of both subdivisions, mindful of their responsibilities to the property owners they represented, insisted on complete obscurity of the substation.

Neighborhood Sets Type of Substation

In more modest areas, both residential and commercial, Union Electric expends the minimum effort on concealment and decoration. The well-kept grounds and clean utilitarian lines of equipment usually are an improvement over the empty lots and shabby buildings they replace.

In more pretentious surroundings efforts are made to landscape stations to make them as unobtrusive as possible.

However, increasing load density in residential areas and the corresponding increase in the number and concentration of substations sometimes allow a utliity little latitude in the choice of a new substation site. Often the projected substation is virtually pinpointed when existing nearby transmission and distribution facilites must be used.

Beauty at Fair Cost to All Customers

The company might have built a substation that would have detracted from the harmonious appearance of the neighborhood. But this would not have been fair to the property owners. It might have built simulated residences or decorative walls to hide its equipment. But both are expensive. It might even have "overbuilt" to create a neighborhood appearance superior to that of the general area, thus penalizing many customers for the benefit of the few.

Here's what Union Electric did.

The equipment planned for the relatively level, 100 by 70-ft site was of the conventional unit type, a transformer and metal-enclosed switchgear. The 34.5/4.36-kv transformer was rated 10,000/12,500 kva and had automatic tap-changing-under-load equipment for regulating distribution voltage. The switchgear had a 5,000-v rating and provided for the switching of four outgoing feeders.

Plans called for auxiliary compartments and two unequipped cubicles for a future transformer and bus-tie breakers. Two overhead 34.5-kv transmission circuits were available for feeding the substation. Normally, the latter would have been switched on a steel structure in the substation yard.

As the first step in making the installation as unobtrusive as practicable, the high-voltage switching structure was eliminated. Switching is accomplished by line switches half a block from the substation. A single underground cable from pole line to substation site was connected directly to a high-voltage junction box on the transformer.

Although switches remote from the substation are not considered a desirable arrangement, some expedient was necessary. It would be too difficult to conceal the structure in the substation yard.

Elimination of the switching structure left transformer concealment the only major problem. The transformer, including its foundation, is about 16 ft high. Had it been installed in the usual way, only large trees could screen it. These would have been out of place on the small lot.

Transformer Installed in Pit

Instead, the transformer was placed in a pit 3½ ft deep with concrete walls and a rock and chat floor. This reduced the height of the unit above ground. For further concealment, an artificial terrace 3½ ft high was built up on the street side, and the crown of the terrace was planted with evergreens whose effective height was thus increased by the elevation at which they were planted.

An ornamental iron fence was built on top of the terrace retaining wall and extended along part of one side. Enclosure was completed by a 6-ft chain-link fence. The site was sodded except in the working areas around the equipment where concrete and chat was used. A flagstone access walk was laid to a gate in the side fence.

Decorative effects are such that attention is directed to them rather than to what they conceal.

Transformer noise played a relatively minor role in the planning of the Jackson substation. When it was discussed during the initial permit negotiations, residents of the neighborhood agreed to accept the utility's assurances.

It was Union Electric's experience that sound barriers are not usually required for the size transformer installed at Jackson substation. The long bus duct between transformer and switching cubicles will permit erection of a sound barrier, should unpredictable noise concentration occur for any reason.

Four Difficulties Encountered

Although satisfying the landscaping and concealment requirements, the installation gave rise to difficulties not encountered at more conventionally designed substations, for example:

1. As no driveway was installed, maintenance vehicles must be parked at the curb rather than convenient to equipment.

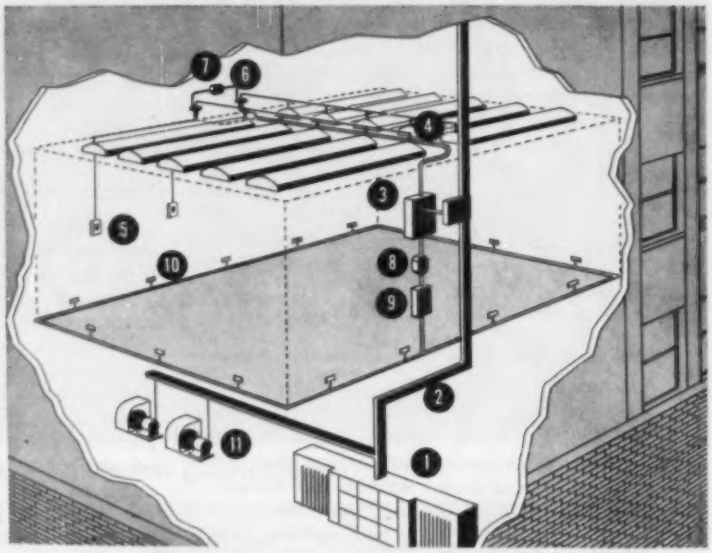
2. The transformer pit had to be provided with drains to prevent flooding during rainstorms. Because of a city ordinance requiring that such drainage be discharged into a storm sewer, the company had to run the drain line about 150 ft from the property to make the connection.

3. Installation of the transformer on its depressed foundation is more difficult than at normally designed substations. This disadvantage is not too important because removal and replacement are expected to be infrequent.

4. The circuit breaker drawout side of the switchgear faces the retaining wall of the artificial terrace. This imposes a space restriction which tends to impede breaker maintenance work normally performed in this area. Maintenance and testing are carried out by means of a special extra-long test jumper after the breakers have been wheeled to the clear space at the end of the switchgear.

BOOK REVIEW

Handbook Outlines Industrial Power Systems



The diagram shows a typical building in which a unit substation (1), or main 480-v switchboard, is installed in basement. Busway risers (2) carry the 480Y/277-v power to each floor. Fusible plugs join busway to panel boards (3), which supply 277 v line-to-neutral to lights (4). The 24-v remote control switches (5) govern lights through relays (6) and a transformer (7). A dry-type transformer (8) rated 480-120 v, single-phase, supplies panel board (9) for floor circuits (10). Elevator, fire pump, and air conditioning motors (11) operate on 480 v line-to-line

480Y/277-V DISTRIBUTION SYSTEM COMPONENTS FOR OFFICE BUILDINGS

The electric power distribution system in a plant generally costs less than 2 to 5% of the plant's total cost, including process machinery. But if the electrical system breaks down, the entire plant output may stop. Thus the importance of the electric power system exceeds by far its proportion of plant cost.

The commercial necessity of properly designed plant distribution networks is acknowledged in a new "Industrial Power Systems Handbook." This volume is edited by Donald Beeman, manager of Industrial Power Engineering at General Electric's Industrial Engineering Section in Schenectady. Sixteen specialists, including Beeman, have authored its 17 chapters and compiled conversion factors, symbols, and mathematical tables for the appendix. Published by McGraw-Hill Book Co, New York 36, N. Y., the handbook sells for $12.

Valuable, Rare, and Lucid

This book is perhaps one of the most valuable yet published for industrial power engineers, consultants, plant engineers, and architects and is a rare work in this field. The authors assume that the reader has a working knowledge of electrical engineering principles. But the subject matter is so clearly presented that many men—even without formal engineering schooling—will be able to comprehend large blocks of its content.

Covers Broad Field

Beginning with a chapter on short-circuit-current calculating procedures, the book covers such important design considerations as selection of ac short-circuit protective devices and circuit equipment; standard voltage ratings, allowable variations, reduction of variations, and calculation of drops; causes of system overvoltages and protective measures; system grounding; equipment grounding; power-factor improvement; system overcurrent protection; selection of system voltages. Other sections include load-center power systems; and circuit arrangements, primary and secondary distribution systems, power systems for commercial buildings (including a discussion of 480Y/277 v), modernization and expansion of existing power systems, industrial steam and power generation, and load and cost-estimating data.

Illustrative examples and data drawn from 15 years of GE experience are packed into the text. "Do not be complacent," the book admonishes in a chapter dealing with ac short-circuit protective devices. Merely because your plant has never experienced a short circuit does not mean that it never will. As wiring and equipment grow older, the short-circuit menace increases. Here's an example:

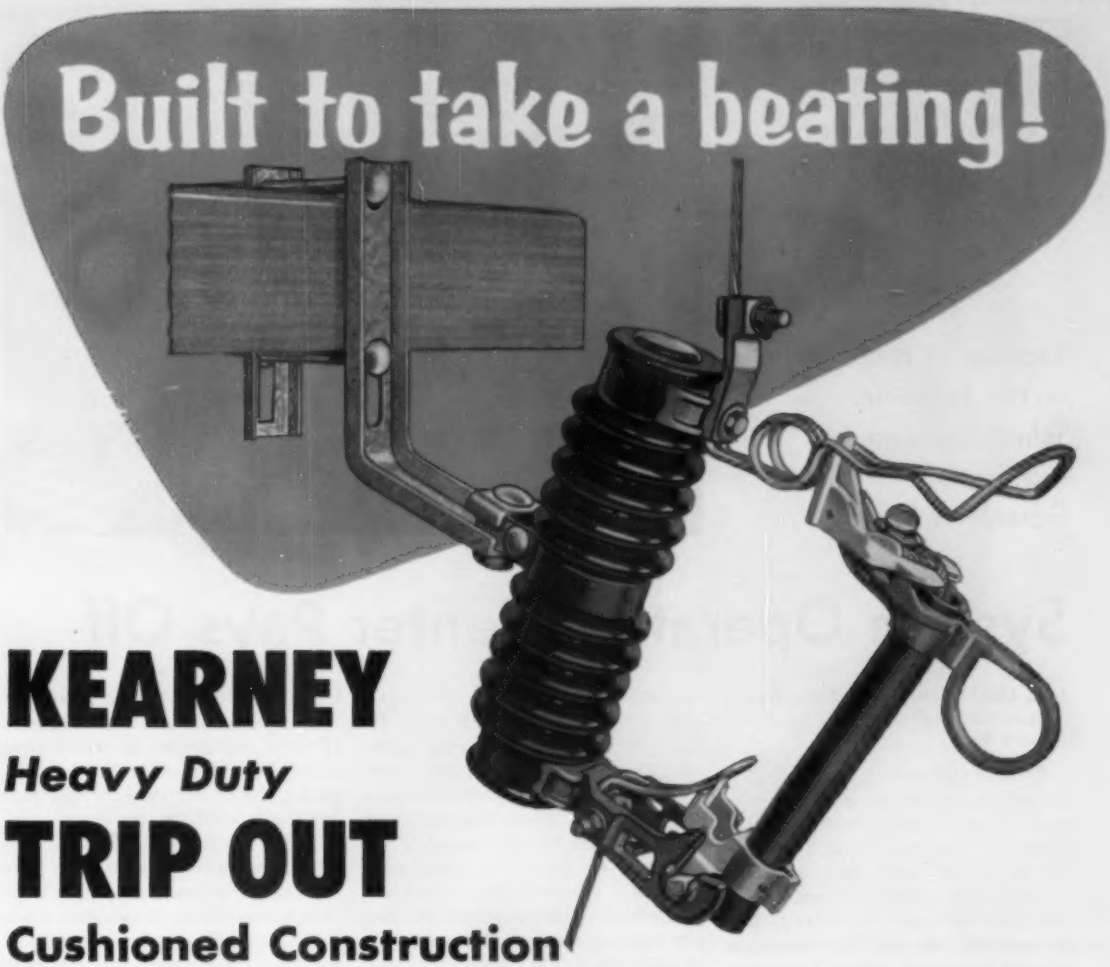
A fault occurred in an outgoing cable in one plant's switch room. The inadequate oil circuit breaker was unable to clear the load. It blew up. The switch house burst into flames and burned completely. Failure of the branch circuit breaker caused the main circuit breaker to open. This killed the entire plant's power and meant needless production shutdown in trouble-free areas.

Gives Friendly Advice

To prevent this from happening elsewhere, observe these points—and the book tells how: Determine accurately the available short-circuit currents at all significant points, install only protective devices with known adequate interrupting ratings, prepare for load growth, be alert to impending overload, eliminate risk with a sound engineering approach.

This book contains a wealth of information in its 971 pages, much of which has been "pre-tested" in various training classes held at GE.

Built to take a beating!



KEARNEY
Heavy Duty
TRIP OUT
Cushioned Construction Prevents Insulator Breakage

Here's how an extra margin of reliability is built into every Kearney Trip Out fuse cutout. Exclusive *cushioned construction* prevents cartridge recoil from breaking the insulator. The spring-type upper contact arms absorb the jolt of high-current fault expulsion gases. In addition, the full double venting of the heavy duty Trip Out greatly reduces cartridge recoil.

Massive construction provides reserve thermal capacity to keep the Kearney Trip Out operating at low temperature . . . even after repeated overloads, contaminated air weathering and years of service. Contact burning is prevented by the toggle hinge that delays separation until the arc is extinguished in the fuse tube.

279

For Better Construction . . . Safer Maintenance

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Because It Helps in the Economic Scheduling and Loading of Generators . . .

System Operation Center Pays Off

J. E. LOGAN, Manager of Power Supply, Jersey Central Power & Light Co, Allenhurst, N. J.

Economic scheduling and loading of generating equipment in the power pool of the General Public Utilities companies last year saved $1.8 million in fuel and labor when compared to independent operation. Jersey Central Power & Light Co's share of the savings was $336,000. The company's recently completed System Operation center at Allenhurst, N. J. is one of the main reasons for this saving. Here the various activities of the Power Supply Department are effectively consolidated. These activities include the functions of the system operators and of load schedule, economy, relay, communication, and planning engineers.

Vital to Operation

The system operation room is vital to this work. It gives essential information through a 11 ft x 56 ft diagram map, recording instruments for telemetered load and weather data, supervisory control equipment, and a communication system with duplicate PBX facilities.

Diagram map is made of perforated aluminum panels secured to millwork wood frames. It resembles a semi-ellipse with the center frames on a 25 ft radius and the side frames on a 15 ft radius. Opposite side of the room has three straight sections. Center section is 11 ft x 16 ft and each side section is 11 ft x 15 ft. These sections can be viewed from centrally located control desks. They are also faced with perforated aluminum except where flush-mounted panels or cubicles for recording instruments or supervisory equipment have been installed. The curved diagram board and panoramic sections join together and form the actual wall of the room.

Diagram board is constructed of metal for maximum durability. Aluminum was chosen because it is light (lower floor loading), easily handled and worked during construction, and when anodized takes a fine permanent lacquered finish which is attractive.

Perforations in the aluminum panels serve as coordinates in constructing additions or changes in the system diagram. They also hold colored pegs to indicate switching positions.

The diagram itself consists of various colored adhesive tapes, each color signifying a different nominal voltage. Transmission and distribution lines, busses, and all equipment symbols are cut from ¾-in. wide adhesive back fabric base tape. Symbols required in large numbers were punched with inexpensive commercial steel rule dies with the aid of a drill press used as an arbor press.

Nameplates designating tie-lines, substations, etc, were made by sticking adhesive backed white paper letters and numbers to black tape and sealing against moisture with a spray coat of clear plastic.

Color Code for Diagram Map

Voltage	Color
115 kv	White
69 kv	Light green
34.5 kv	Yellow
26.4 kv	Orange
13.8 kv	Pink
12.5 kv	Light green
4.8 kv	Brown
4.16 kv	Light peach
2.4 kv	Gray

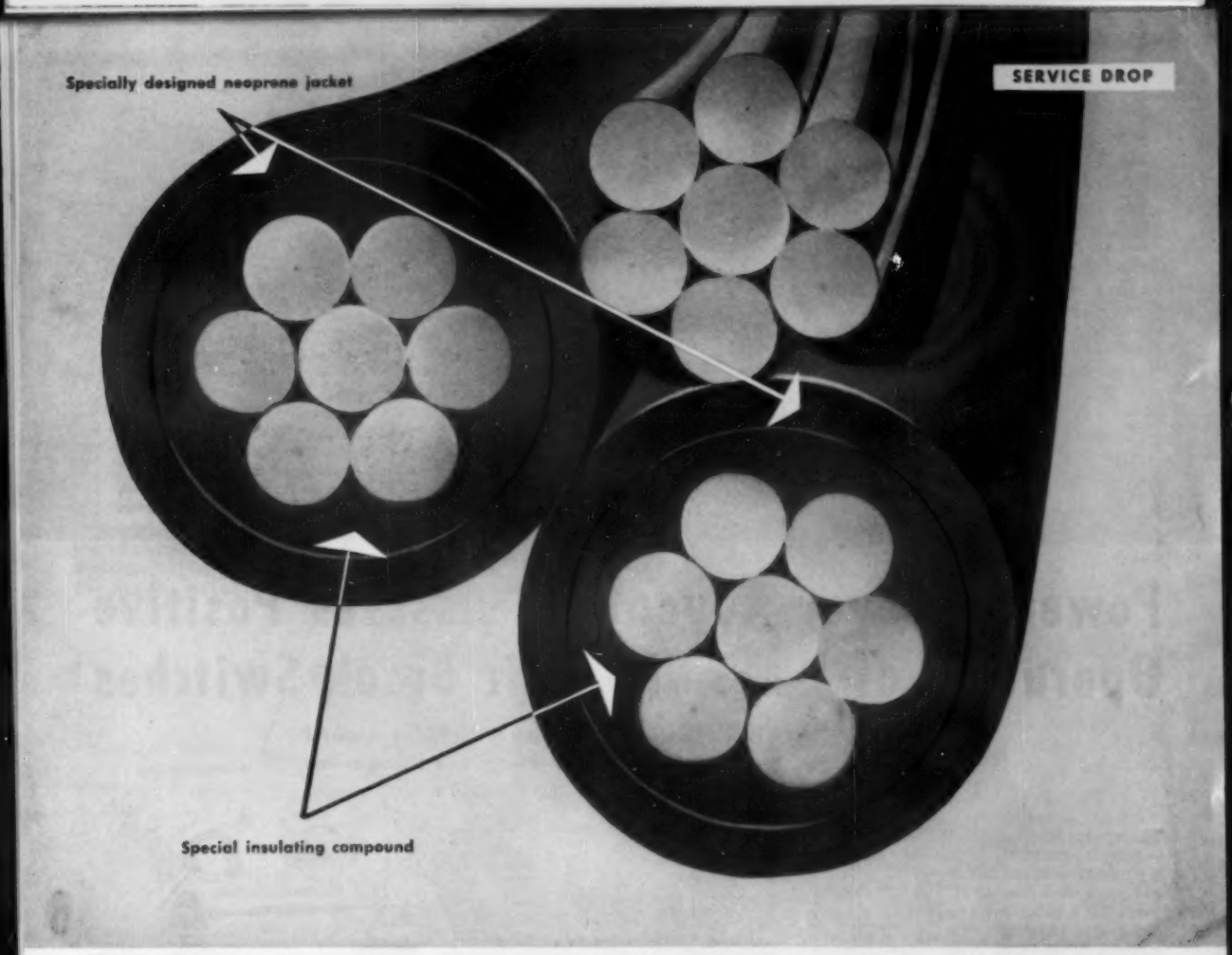
Colors were chosen solely on the basis of their contrast with the green background and with each other. Yellow was chosen for the most dominant color (34.5) because of its restful compatability with green.

Grate-Light Ceiling

Major source of illumination is a grate-lite which composes all but the extreme outer rim of the ceiling. The grate-lite is ⅜-in. thick plastic and formed in ⅜-in. cubes permitting maximum 45 deg off-the-vertical direct illumination. Continuous strings of fluorescent tubes are mounted 3½ ft above and spaced 18 in. on centers to secure the desired illumination level.

In addition to the grate-lite ceiling,

(*Continued on page 25*)



TWO-WALL CONSTRUCTION, unique with ANACONDA 2+2 Type N-SD cable, gives high mechanical and electrical service reliability.

New 2+2 N-SD Cable gives double protection

ANACONDA 2+2 Type N-SD service drop is designed to out-perform other N-SD cable—both electrically and mechanically.

Its conductors are covered with not one, but two, precisely formulated compounds. Each layer is built to do a single job best.

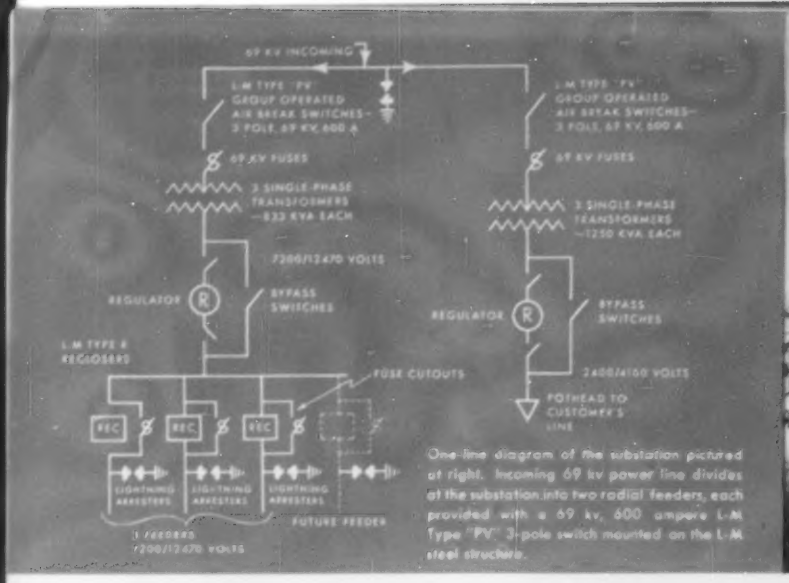
The inner layer is a high-grade rubber insulation . . . with excellent electrical properties and high heat and moisture resistance.

The outer layer is a tough, durable neoprene jacket . . . best for wear and weather resistance.

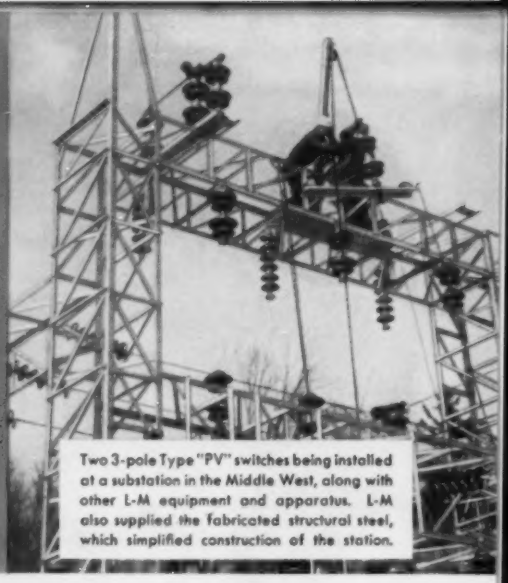
Together these two layers give 2+2 cable outstanding service reliability. Your Anaconda salesman or distributor has full details. Call him today. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

ANACONDA®
ALUMINUM AND COPPER WIRE AND CABLE

ANACONDA 2+2 TYPE N-SD CABLE: lightweight . . . sturdy . . . easy, fast to install . . . free-stripping, clean to handle . . . neat.



One-line diagram of the substation pictured at right. Incoming 69 kv power line divides at the substation into two radial feeders, each provided with a 69 kv, 600 ampere L-M Type "PV" 3-pole switch mounted on the L-M steel structure.



Two 3-pole Type "PV" switches being installed at a substation in the Middle West, along with other L-M equipment and apparatus. L-M also supplied the fabricated structural steel, which simplified construction of the station.

Powerful Lever Advantage Assures Positive Operation of L-M's "PV" Air Break Switches

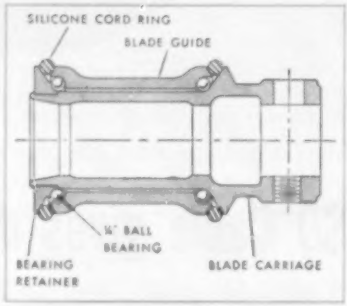
New rotating switch blade concept in switch design provides powerful lever advantage, assures positive operation to open or closed switch position regardless of ice, corrosion, or long periods of non-operation.

The primary function of the air break switch is to provide a means of connecting or disconnecting transmission and distribution circuits. In addition it must meet all of the other requirements for a good switch—ease of operation, convenience and simplicity of installation, high current-carrying capacity, high contact pressure without undue wear.

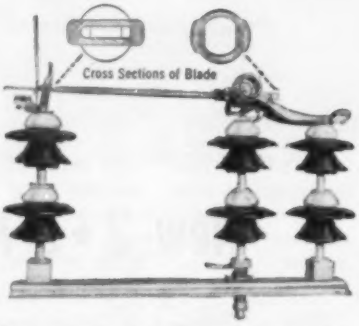
We have amply met these requirements in our Type "PV" Rotating Insulator, Vertical Break, Air Switch. Some of the outstanding features are: silver-to-silver high-pressure contacts; new contact design, with contact pressure easily adjusted in the field; ball bearings lubricated for life with silicone grease and sealed with silicone cord rings; only 6 current interchange points in the entire switch; flexible interphase mechanism assembly, permitting angular distortion of mounting structures.

These switches are for both pole and structure mounting in horizontal, vertical, or inverted position. The interphase assembly, connected direct or indirect, transmits power to the switch mechanism with minimum of lost motion. Every joint of the interphase assembly is lubricated with silicone grease and sealed with a silicone cord ring. Ratings are from 7.5 through 69 kv in 400 and 600 amperes continuous current-carrying capacity. Available with or without horn gaps, from one- to six-pole units.

For complete information on L-M Type "PV" Switches ask the Field Engineer for a copy of Bulletin PSE1 and PSE2, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).



Smooth, Easy Operation—The method of sealing a bearing or a joint is shown in sketch above. All the bearing locations or joint locations involved in movement and transmission of power from the operating mechanism to the switch blade itself are protected from corrosion with silicone lubricant sealed in by silicone cord rings.



L-M's new 69 kv Type "PV" switch, above, has major castings of high-grade aluminum bronze alloy, which makes them exceptionally strong, permits lighter cross sections, and is virtually free from corrosion.

New Switch Design Assures Positive Operation

Drawings show blade rotation and rise between the jaw contacts.

1. Normal closed position—blade between contacts and locked in position by the action of the link and crank assembly.

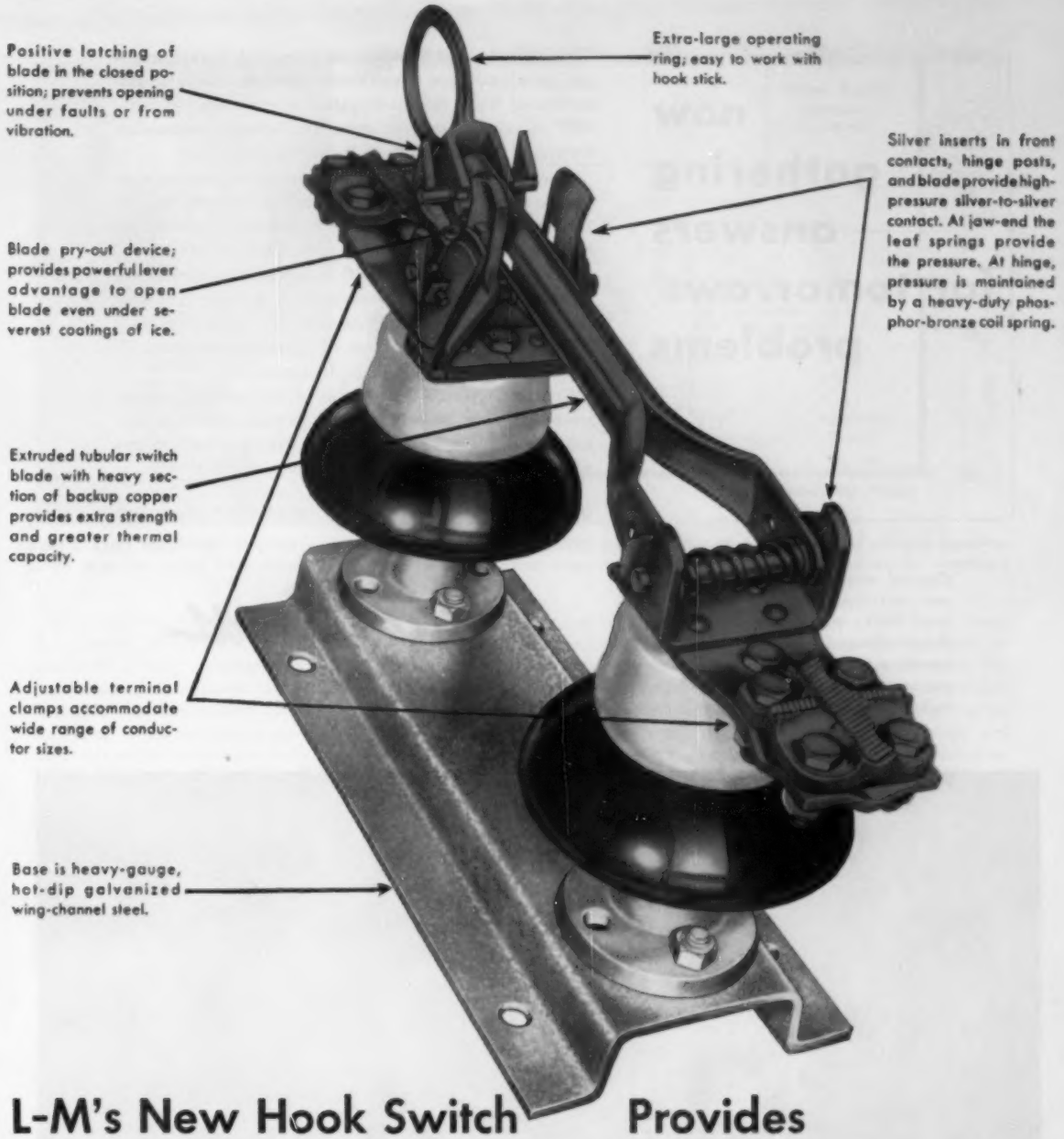
2. Start of opening motion. The blade twists 26 degrees before rising, with all the force applied at the operating handle being imparted to this twisting action, thus assuring positive breaking of any ice or corrosion.

3. The blade is now starting to rise. It has rotated 40 degrees with only a 3 degree rise. Also note how blade rotation has moved the silver inserts away from the silver inserts in the contact shoes, minimizing wear.

4. With approximately 37 degrees crank rotation, the blade has been rotated a full 48 degrees, but has risen only 6 degrees.

5. Blade has risen 9 degrees with a 56 degree blade rotation. On closing the switch, the reverse motion provides the most effective possible ice-breaking action if the switch should be iced open.

LINE MATERIAL *Power Switching Equipment*


Positive latching of blade in the closed position; prevents opening under faults or from vibration.
Extra-large operating ring; easy to work with hook stick.
Silver inserts in front contacts, hinge posts, and blade provide high-pressure silver-to-silver contact. At jaw-end the leaf springs provide the pressure. At hinge, pressure is maintained by a heavy-duty phosphor-bronze coil spring.
Blade pry-out device; provides powerful lever advantage to open blade even under severest coatings of ice.
Extruded tubular switch blade with heavy section of backup copper provides extra strength and greater thermal capacity.
Adjustable terminal clamps accommodate wide range of conductor sizes.
Base is heavy-gauge, hot-dip galvanized wing-channel steel.

L-M's New Hook Switch Provides High Thermal Capacity, Trouble-Free Operation

L-M's new outdoor, hook-operated disconnect switch provides high thermal capacity under short-circuit conditions; assures trouble-free service in sectionalizing, disconnecting or by-passing applications.

This new switch can be mounted on either poles or substation structures, in vertical or inverted position.

Outstanding features include: positive blade lock-in and pry-out devices; minimum of current interchange points; heavy copper tubular switch blade; silver-to-silver high-pressure contacts.

Available in single-pole, single-throw and single-pole, double-throw, 400 and 600 amperes, 7.5 kv through 69 kv; 1200 ampere switches in the same voltage ratings will be available soon. For full information ask your L-M Field Engineer, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

LM **LINE MATERIAL**

Power Switching Equipment

224

now gathering answers for tomorrows' problems

To the problems of insulation for extra-high voltage, multiple conductors add unanswered questions about special hardware. We're busy now gathering experience—laboratory experience—in this extra-high voltage transmission technique, at the Ohio Brass Barberton Laboratory.

Here, men who work daily with insulation *and* hardware investigations are in a unique position to examine the performance of insulator-hardware combinations needed for multiple conductor, extra-high voltage transmission.

Add to this the knowledge O-B development people have gained in the design and installation of multiple conductor lines already in use! Ohio Brass is already rich in knowledge of techniques that may be as much as decades away for commercial extra-high voltage transmission.

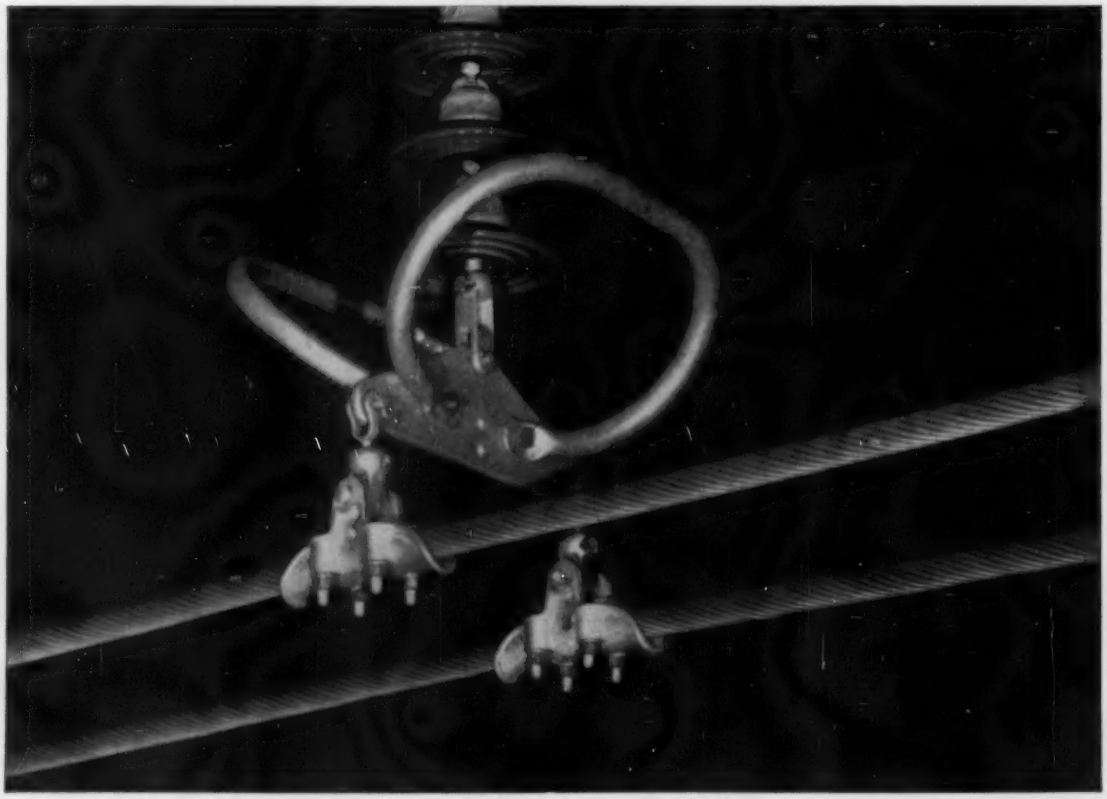
Constant research is a portion of the technical competence that keeps Ohio Brass ready to cope with every new industry problem. This competence can be helpful to any power company now studying EHV possibilities. Call on us!

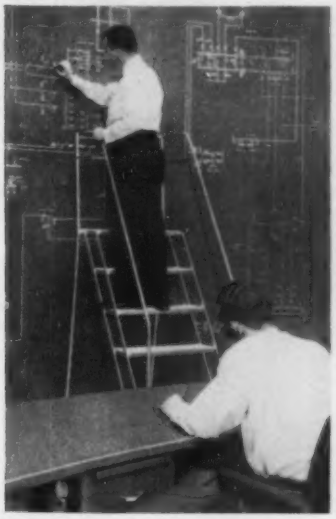
OHIO BRASS COMPANY • MANSFIELD, OHIO

Control rings and associated hardware developed for dual conductors in a 345-kv application. Only Ohio Brass offers an organization adequately equipped to design, produce, and test this equipment for extra-high voltage transmission.

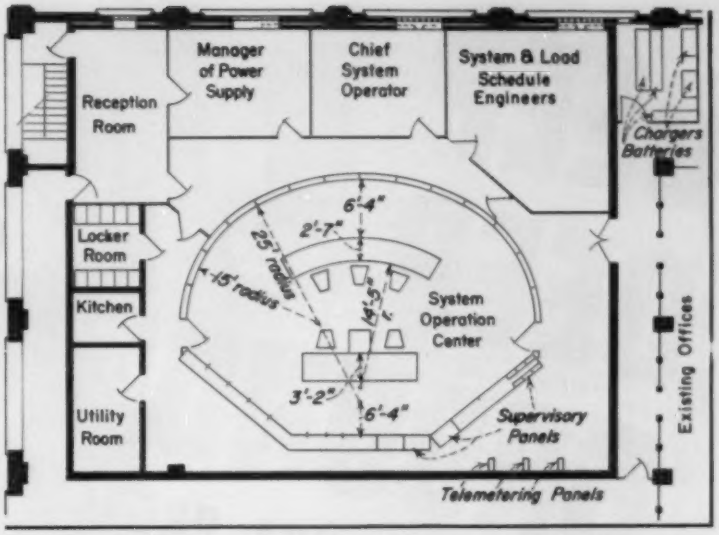
Ohio Brass

4549-H





PERFORATED aluminum diagram map holds pegs for switch positioning



SYSTEM OPERATION CENTER has been installed in portion of existing building. Layout provides office space for engineers in addition to space for operators

(*Continued from page* 20)

the diagram board and instrument panels are directly illuminated from a cove-mounted continuous string of fluorescent fixtures around the entire perimeter. These fixtures are equipped with asymmetric fresnel lenses so that the light from top to bottom of the wall is uniform. Light colored linoleum is placed at the base of the curved board. Its reflective qualities increase illumination at the lower levels of the board. Cool-white fluorescent tubes are used throughout.

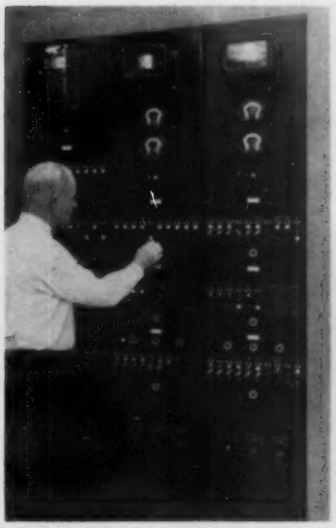
This design reduces eye strain by minimizing glare, reflections, and shadows and allows fast and accurate discrimination of diagrams.

Outside of the operation room a portion of the curved wall forms one side of a hall for four offices. Rest of the area is utilized for essential equipment, lockers, kitchen, and utility rooms. Entire space measures 52 ft x 72 ft and was built as a unit within the existing service building. This unit, separately sound proofed and air conditioned, is adjacent to a new battery room and offices (See floor plan).

Telemetering equipment shows on double pen recording instruments Mw and Mvar flow for each interconnection and generating station as well as total generation, net interchange, and system load. Single pen recording instruments show local frequency in the 55-65 cycle range and a remote 115-kv voltage used as control point.

Principal switches in 14 major substations are controlled and supervised remotely from the operation center.

(*Continued on page* 27)



MAJOR substations are controlled remotely from system operation center

OPERATORS CAN determine energy flow and demand from battery of recording instruments. Local frequency in 55-65 cycle range is also shown on recorders

DEEP DEEP GROUNDING

INSURES EXTRA PROTECTION

• Heat treated, alloy steel driving stud resists mushrooming — can be used over and over. Couplings of rugged Silicon Bronze.
• Completely copper-covered machined point speeds driving. All rod sections are threaded on both ends for use as top, intermediate or bottom section.
Permanently Moist Soil
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GROUND RODS

Blackburn Sectional Rods Get Down Into The Permanently Moist Soil

Drive down to permanently moist soil that gives lower earth to rod resistance. Actual experience shows a few dollars invested in deep grounding has saved thousands of dollars in overhead burn-outs.

- **BLACKBURN** Sectional Rods have a uniform coating of highly conductive corrosion-resistant copper, molecularly bonded to *rigid steel core.*
- Driving studs and couplings interchangeable with all standard sectional ground rods.
- Available through Electrical Distributors.

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Operation Center

(*Continued from page* 25)

This is accomplished with equipment that sends coded impulses or combinations of frequency tones over leased telephone circuits. Equipment using frequency tones also has selective telemetering of Mw and Mvar for principal lines and voltages on main busses. It is planned to expand remote control for air break switches at 30 minor substations. This control will only be used for sectionalizing purposes after a permanent fault has occured on an OCB-protected transmission line.

Two identical telephone switchboards have complete flexibility in transferring calls between leased telephone circuits to other centers, station intercom systems, local trunks, or private exchange tie-ins. If there is a telephone failure, the company two-way radio can supply communications to all parts of the system. A two-channel continuous 24 hr tape recorder is connected to each telephone switchboard.

Power Plant Waste Sold as Aggregate in Britain

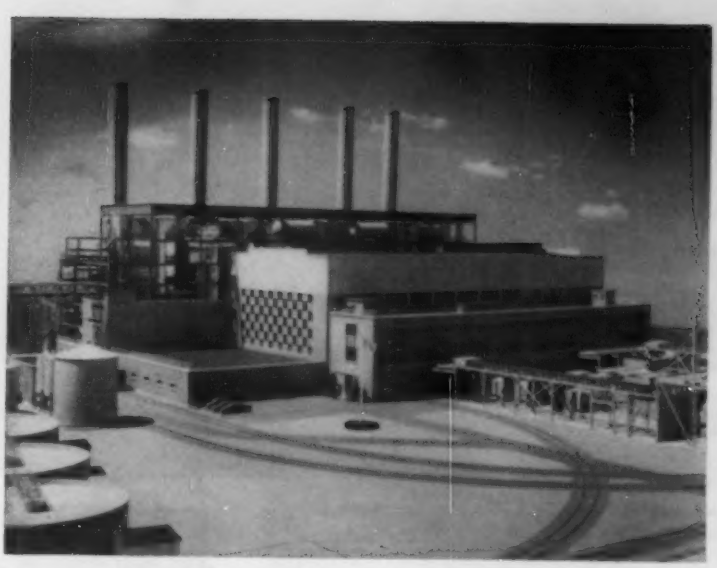
A new and sizable source of light-weight aggregate for concrete has been found in a waste-product at Great Britain's Battersea Power Station.

The Central Electricity Authority has signed a contract to supply the Cementation Co with 65,000 tons of waste fly-ash a year. The ash, produced by pulverized fuel boilers at Battersea, will be converted into aggregate by a special process.

The contract promises a happy solution to two problems—one involving aggregate supply and the other, disposal of fly-ash.

CEA's contract anouncement stated, "Production, in the heart of London, of a light-weight alternative to other aggregates which are growing scarce and costly, including gravel which at present has to be brought in some 20 miles or more by road, is a development of special significance to the building industry.

"From the standpoint of the CEA, this solution to the problem of disposal of fly ash, which commonly involves transportation and dumping on waste land or at sea, is both convenient and profitable."



PSE&G Building New 450-Mw Plant

Construction is in progress on Public Service Electric & Gas Co's new 450-Mw Linden plant. Station will supply all steam requirements of adjacent Esso Standard Oil Co's Bayway Refinery and in return will obtain high-viscosity fuel oil from refinery processes. A raw water supply will also be provided by the Esso plant.

One 225-Mw, 2,000 psig, 1050F unit is scheduled for operation in spring of 1957. A second unit with a reheat steam cycle and rated 225 Mw, 2,350 psig, 1100/1050F, is scheduled for late 1957 operation. First unit will be served by three 1-million lb-per-hr boilers (process steam requirements favor this arrangement). Single boiler for second unit will deliver 1.9-million lb-per-hr. Estimated cost of the station, including transmission to rest of system, is $100 million.

Seven Washington PUD's Reduce Rates

Rate reductions instituted in the last six months by seven Washington state PUD's will mean annual savings of an estimated $736,080 for their customers, according to figures supplied to the Washington PUD Association by R. W. Beck & Associates, utility analysts and engineers.

Largest recent reduction is a 20% cut in commercial rates by the Grays Harbor County PUD, which earlier had lowered its rates to schools, churches, local governments, and non-profit community-sponsored organizations by 36.8%. General rate cuts by the Benton, Franklin, and Snohomish County PUD's are estimated to result in annual savings of $457,000. Snohomish also reduced its rates for street lighting and other municipal services.

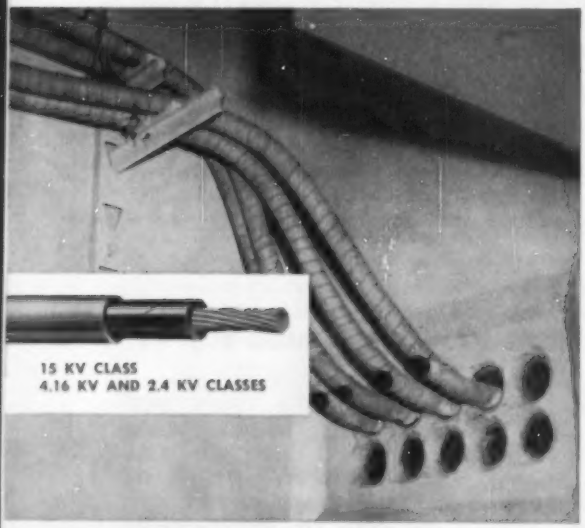
The Clark County PUD made two small reductions in irrigation rates and street lighting while the Cowlitz County PUD lowered its commercial rates. The Chelan County PUD reduced the rates for residential and water-heating customers in the Lake Chelan area it acquired from the Washington Water Power Co.

The PUD's cite four reasons for their ability to make rate reductions: Cheaper money, debt reductions, increased consumption, and increased operating efficiency. People in PUD counties, they assert, used 14.5% more electricity in 1954 than in 1953 compared with 11.1% increase for Puget Sound Power & Light Co and 6.7% for Washington Water Power. The PUD spokesmen added that distribution expenses have been lowered from $13.20 a customer in 1953 to $12.97 last year while expenses for customers' accounting and collecting were lowered from $6.29 to $6.21 during the same period.

15 KV CLASS
4.16 KV AND 2.4 KV CLASSES

A G-E INTERLOCKED ARMOR CABLE For use above ground. Both indoor and outdoor runs. Cable runs along elevated pipe structure. Supported by racks, trays, or messengers.

V G-E VARNISHED CAMBRIC LEADED CABLE For conventional underground installation. High impulse strength for voltage surges. The lead sheath is impervious to moisture.



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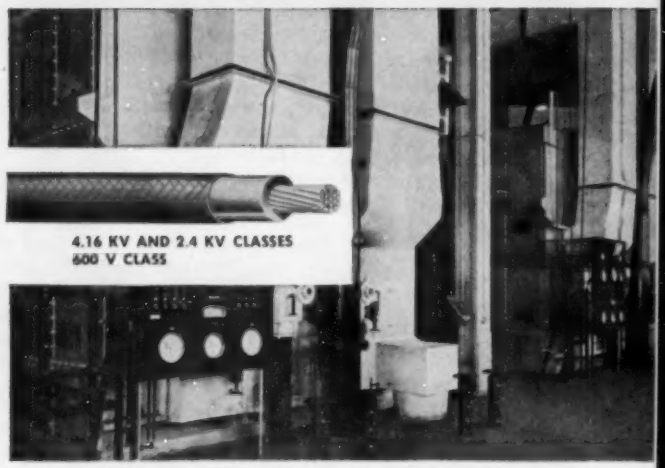
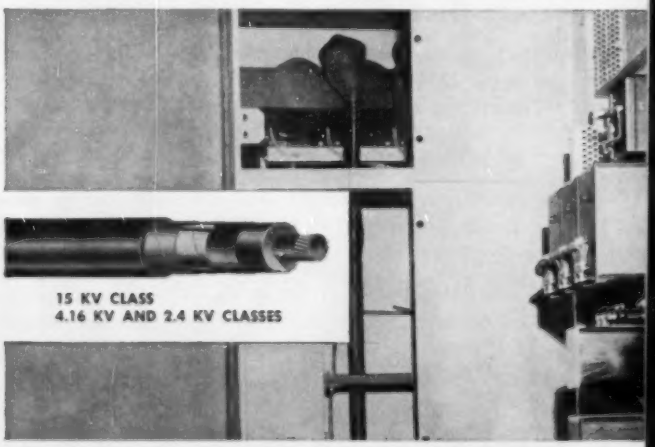


4.16 KV AND 2.4 KV CLASSES
600 V CLASS

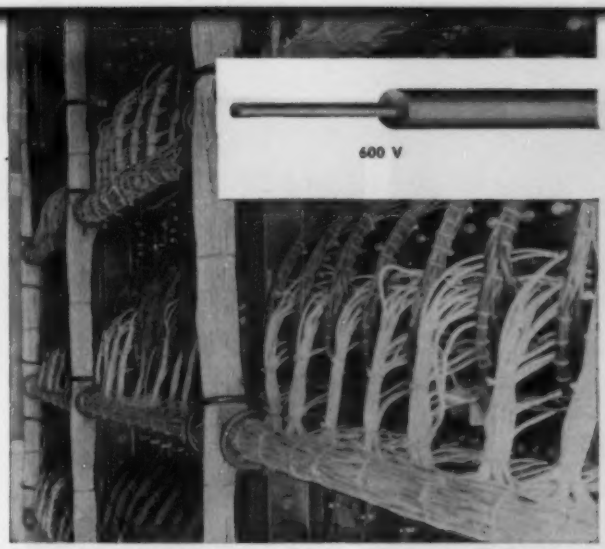
G-E SILICONE RUBBER CABLE For use where high ambient temperatures, high humidity, corrosive vapors and other severe operating conditions exist. Extra reliability in case of nearby fire.



15 KV CLASS
4.16 KV AND 2.4 KV CLASSES

G-E SUPER CORONOL* GEOPRENE* CABLE For underground use. Duct, conduit, and raceway installations, or burying cable directly in the ground. Resists oxidation, ozone, corona, sunshine, water, etc.

G-E PREASSEMBLED AERIAL CABLE Mostly for outdoor runs. Long spans, supported by poles, towers, or buildings.



G-E FLAMENOL* CABLE The ultimate in chemical resistance above or below ground level. Single conductors in ducts, raceways, conduit, or buried.

G-E VERSATOL* GEOPRENE CABLE For cables above or below ground level. Large conductors, heavy loads. Resists moisture and chemicals. Flexible—an all-purpose cable.

TO MEET YOUR NEEDS FOR INCREASED POWER

Select a G-E cable to meet your requirements

Since reliable power supply is a vital factor in any industry, you'll be interested in high-quality cable of the right type for your application. Specify General Electric cable to meet your needs.

POWER CABLES for special or general purpose; for feeder systems, distribution systems, equipment leads and railway, shipboard, and mining applications.

CONTROL CABLES for aircraft wiring, station and communications systems, and appliance and equipment wiring.

For other industrial applications, specify General Electric Cords and Wires

G-E CORDS are available for practically every type of electrical appliance or industrial equipment.

G-E MAGNET WIRE can be furnished to meet every requirement of industry for long-lived and dependable electrical apparatus.

To meet your power requirements, select a General Electric cable, wire, or cord. Write Section **W157-827**, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

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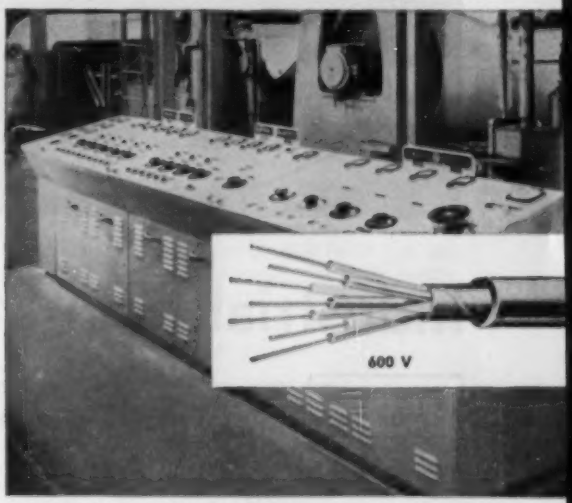
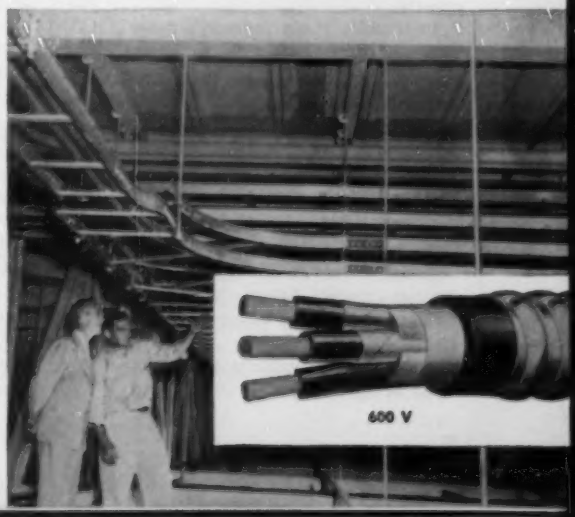
Progress Is Our Most Important Product

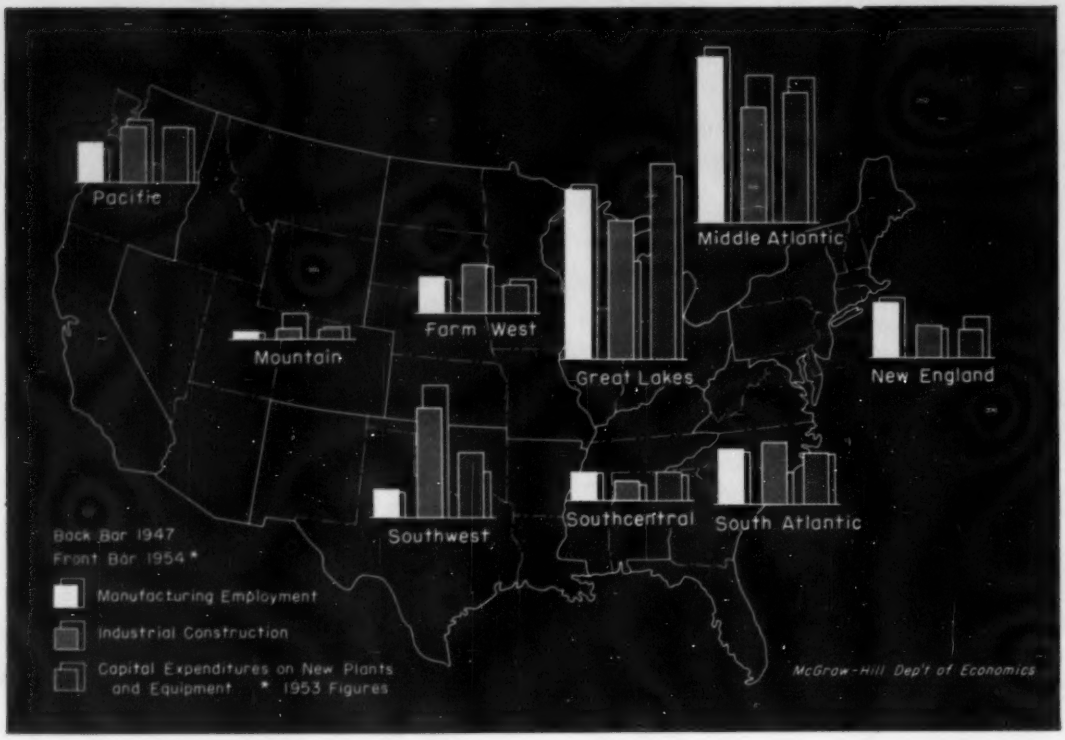
GENERAL ELECTRIC



G-E FLAMENOL CONTROL CABLE For important control circuits, switchboard leads, and motor leads. Can be installed in open air, in ducts, or in conduit.

G-E VARNISHED-CAMBRIC FLAMENOL INTERLOCKED ARMOR CABLE For installation above ground. Indoor and outdoor exposures. Resists mechanical abuse.





Industrial Map Still Changing

MANAGEMENT
Statistics

Rate of migration from East and Midwest to South and West has not slackened since 1947, McGraw-Hill 7-year survey affirms

Industry continues to move from the East and Midwest to the South and West at a rate that has not slackened since the World War II dispersion program dramatically began to remake the industrial face of the U. S., the McGraw-Hill Economics Department reports.

In tracking down industry's movements since 1947, McGraw-Hill used three yardsticks: (1) Manufacturing employment, as gathered from figures of the U. S. Bureau of Labor Statistics and various state agencies; (2) Capital spending by manufacturers for new plant and equipment as reported by the annual surveys of the Bureau of Census and the last complete manufacturing census in 1947; and (3) Industrial contract figures compiled by Engineering News Record, a McGraw-Hill publication.

Manufacturing capacity is now half again as big as it was in 1947, reflecting close to $40 billion in manufacturers' outlays for new plant and equipment. Almost as much more was spent for replacement and modernization. This money went out of New England and the Middle Atlantic areas into the rest of the country, especially the Southwest and the Pacific Coast. The movement is no longer confined to a few industries, such as textiles and leather, but is now, by and large, across the board.

Why Industries Move

Industry's reasons for leaving New England are principally these: Relatively high transportation costs, lack of raw materials, high labor costs, and lagging population growth, the last detracting from its appeal as a market.

The South's appeal is a growing demand for consumer goods, where labor is plentiful at wages industry likes. Cheap power is a potent attraction, especially when coupled with an abundance of other natural resources. Local tax concessions, fast plant write-offs for construction outside established industrial areas, and the over-all aims of industrial dispersal in the atomic age exercise important drawing power.

Manufacturing employment figures for 1947 and 1954 indicate that New England and the Middle Atlantic States lost 3% of their share of total factory jobs in the country. This loss was the gain of the West and South, the Great Lakes and Farm West (grain belt) regions standing pat.

Capital spending figures for new plant and equipment confirm this shift. Data for 1953, latest available, show the Northeast with a 5% smaller share of the U. S. total than it had in 1947. The South is up 4%, the North Central up 1%, and the West has no change.

In new industrial construction contracts the Northeast showed a 5% loss in its share of the total since 1947. Whereas in 1939 it accounted for 40% of new plant building, its portion in 1954 was less than 25%. Meanwhile, the South added 2% to its share; the North Central, which dropped 13% between 1939 and 1947, recovered some of its loss; and, the West, for the first time, has a 5% dip, most of which was centered in the Mountain States.

The Middle Atlantic States, long the top industrial area, no longer has that ranking. In 1947 there was little choice in calling either the Middle Atlantic or the Great Lakes area the No. 1 industrial region. By 1954 the choice was clear. The Great Lakes was definitely on top.

The last seven years have reversed the downtrend that was apparent in the South Atlantic States between 1939 and 1947. The area embracing Florida, Georgia, South Carolina, North Carolina, Virginia, and West Virginia is now the third-ranking industrial region in terms of factory jobs. While still trailing the Great Lakes and Middle Atlantic by a sizable margin, it has passed New England.

Now the top industrial area, the Great Lakes did not climb to the highest rung because its gain in number of jobs was big. Actually, in terms of its share of the nation's factory jobs, it dropped back 1%. But the Middle Atlantic skidded 2%, thus making the difference.

Farm West's Gain Small

Moderate growth has been the industrial lot of the Farm West for many years. Since 1939 it has increased its share of employment in manufacturing by 1%. Actual factory jobs climbed 13% between 1947 and 1954.

As a region, Alabama, Kentucky, Mississippi, and Tennessee are saved from having the smallest share of factory jobs only by the still smaller showing of the Mountain States. In 1947 these South Central States also managed to top the Southwest. But that was before the Southwest's recent spurt.

The Southwest—Arkansas, Louisiana, New Mexico, Oklahoma, and Texas—make up what is now the second fastest growing region, and from all signs it may soon be the fastest.

Measured by factory jobs, the Mountain States of Arizona, Colorado, Idaho, Montana, Nevada, Utah, and Wyoming make up the smallest industrial area. Together, they account for just over 1% of the national total. Between 1947 and 1954, factory jobs rose 18%. Durable goods, especially aircraft, led the way.

Coast Fastest Growing

Gauged by manufacturing jobs, the Pacific Coast is the fastest growing industrial area. It added 2% of all U. S. jobs to its share of the total. Now ranked fifth industrially, it should pass New England and the South Atlantic by 1960.

By 1954 the effects of industry's decentralization and its shift from big metropolitan areas were beginning to show clearly across the country. The metropolitan areas are starting to lose out. Smaller cities and towns are registering the healthy gains..

Primary metals industries are migrating from the Northeast to the South and West. Electrical machinery has undergone a striking shift. The Pacific Coast raised its postwar share of jobs by about 4%, and the Southwest added to its relatively small share by 1½%. The Great Lakes' share dwindled by 3%, and New England and the Middle Atlantic States, together, showed a drop of 2% in electrical machinery jobs.

Autos, with 82% of its jobs concentrated in the Great Lakes States in 1947, has shifted slightly into the rest of the country. The Middle Atlantic got the bulk of the shift, 2% of the total. Aircraft has shifted dramatically since the war's end. The Middle Atlantic and New England States combined to lose about 11% of their postwar share of jobs. The Pacific, with about 38% of the industry's employment, lost 3½% of its share. Against this, the Great Lakes added 6%, the Farm West about the same, and the South Atlantic, with Georgia leading, 2½%.

Shipbuilding Shifts

The Middle Atlantic lost 9% of its share of shipbuilding jobs, mostly because of a sharp drop in New York shipbuilding employment. New England increased its share by 5%, and the Pacific lost 3%. South Atlantic shows the largest increase, an extra 6% over 1947.

Railroad equipment, with more than 90% of its jobs in the Great Lakes and Middle Atlantic States, shifted from one region to the other. Furniture shows an unusual migratory pattern. The Great Lakes lost 3%, and the Pacific 1. The South Atlantic, North Carolina leading, added more than 2%, while New England and the Southwest each increased their shares by more than 1%.

Textiles are moving to the South Atlantic faster than ever. This region, accounting for 39% of 1947 textile jobs, increased its share to 47% in 1954. The gain was at the expense of New England and the Middle Atlantic States. Apparel has grown throughout the South. The Middle Atlantic, with 59% of the industry in 1947, lost 5% of its share. The Great Lakes also lost. But the South Atlantic added 3%, the South Central States 3%, and the Southwest 1%.

Printing and publishing are moving from the Northeast to the South and West, and pulp and paper are holding closely to the overall trend. Chemicals show one major shift. The Middle Atlantic's share has been cut nearly 6%, bringing its portion to less than 31%. All regions, except New England, benefited.

The trend to industrial decentralization because of the hydrogen bomb has only started. If it really gets going, it could mean billions of dollars of new industrial plant would be located in areas that today are wheat fields or swamp lands.

Farm West May Gain

What the St. Lawrence Water Way will mean to industrial migration is not yet clear. But it appears that the Great Lakes area could account for 50% of American industry in ten years. Industry may move also into the Farm West States, neighbors of the Great Lakes States. The farm states are not far from lake ports, although distant enough from today's heavily industrialized areas to fit into a decentralization policy.

The new minimum wage law may help to slow down industrial migration. The wage differences between the Northeast and the South will shrink. Wide wage differentials will no longer be a major reason for manufacturers moving south. Unionization will also help narrow wage differentials. In recent years, for example, the traditional North and South differential has been eliminated in steel.

At the same time, rising wage levels in the South are strengthening the appeal there as markets.

READERS FORUM

Mr Innes Gets Congratulatory Note

[The following letter was received by Frank R. Innes, retired EW associate editor, following publication of his letter, "Utilities Must Furnish Power, Promote Its Use," on page 266 of the June 27 issue. It is reprinted with the permission of Mr. Thomson—The Editor.]

Dear Mr. Innes:

I just read your letter to the editor in Electrical World, and I must congratulate you. Far too many utility companies fail to operate progressively, and this has been true for years—the mere existence of this corporation is proof of that. Worse yet, far too many member-owned electric systems are adopting the same attitude.

I never heard of a Buick dealer telling a prospect that he can't afford a Buick. Too many people in the electric distribution business are telling their prospects that they can't afford "Electric Buicks."

Your editorials in previous years were good—(I disagreed sometimes). I am glad you are still plugging for progressive policies in electric distribution.

More power to you!

R. E. Thomson
Manager

Carroll County Rural Electric Membership Corp
Delphi, Ind.

Too Many Gas Men in Our Industry

To the Editor:

I have read Mr Bary's article, "Cooling Load Needs Complement" (May 9, p 15), and Mr Innes's letter of comment (June 27, p 266). Both are very interesting and lead to one general conclusion—too much gas engineering, too little electric selling. I believe Mr Innes has failed to emphasize a very important consideration in the electric house-heating situation, which is that too many men educated in the gas industry and steeped in gas lore are now trying to operate the electric utility business and, in so doing, are proving to be excellent utility gas salesmen. The SEC has made a statement along this line which runs like this: "It is the inevitable tendency of the joint control to favor that business in which it is most interested and which is most profitable."

Ostrich-like, the heads of many of our top utility men repose in the dank sands of yesterday, oblivious to the fact that each gas house-heating installation is potentially the equivalent of a 2-wire, 30-amp residential electric service. This awakens memories of the convention slogan of the twenties—"The low-use customer doesn't pay his way."

Unfortunately, the electric utility industry has shunned electric house heating like the "seven-year itch"—not just the "small-fry" companies but many of the so-called industrial leaders. For example, one of the papers at the recent EEI convention sounded the clarion of "Let's get into action" and deplored the obsolesence of the American home. Yet the paper did not once mention electric house heating as a part of the program for improved living standards. What the electric utility industry needs most is aggressive men who will promote the 200-amp residential service and will strive to remove gas from the corporate name. It can stand less of the men of that mossy age who still think that the existence of illuminating or lighting in the corporate name represents the essence of the electric utility business.

E. T. Hughes

750 N. Dinwiddie St
Arlington, Va.

St. Louis Bids for Museum

To the Editor:

Since receiving a copy of George V. Mueller's letter of April 18 published in the May 2 issue, as well as a copy of the March 28 editorial on "First an Inventory, Then a Museum," I have discussed with the museum's board of directors the suggestion that the very important electrical museum pieces received last fall from Purdue University be a nucleus around which a comprehensive electrical museum might be developed here in St. Louis in conjunction with the Museum of Transport.

The Museum of Transport occupies a 54-acre tract of land, sufficient to allow any conceivable development. With this much space available it has been the policy of the museum to offer suitable areas for development of historic collections from within the transportation industry or related industries.

Further impetus is given this suggestion for locating in St. Louis by the strong bid that the city is making for the permanent location of the various engineering societies in this central point of the country. Both city and Chamber of Commerce officials heartily welcome the possibility of the development of an outstanding permanent electrical museum here and assure utmost cooperation as the plan may develop.

Therefore, I hope that you will find someone who will "carry the ball" in this matter so that project may materialize.

John P. Roberts

The Museum of Transport Inc
Barrett's Station Road
St. Louis 22, Mo.

Adequate Wiring Article Commended

To the Editor:

Congratulations on your timely, well-written article "Adequate Wiring: Where Is It Going?" in your June 27 issue (p 107).

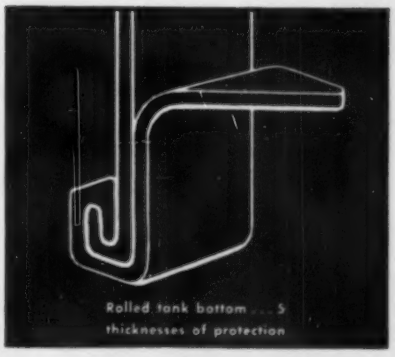
Such excellent facts as these should surely give cause to the electrical industry to reevaluate its manifested and vested interests in better residential wiring.

Robert A. Edwards
Office of Mr R. W. Johnson
Executive Vice President
Appliance and Electronics Group

General Electric Co
New York 22, N. Y.

H. H. Humphry, Distribution Transformer Product Engineer, points out this

FACT: New transformer design retains rolled bottom for maximum seal and strength



The exclusive rolled tank bottom design has been retained on the new Westinghouse pole-type distribution transformers. Five thicknesses of steel, coated with rubber-base cement and formed under pressure, are tapered to prevent water entrapment. This type of tank bottom construction is *still* unequaled for rigidity, strength and protection against corrosion and oil leakage.

More proof that you *can* get more for your transformer dollar.

• • •

For all the facts, call The Man With The Facts—your Westinghouse Sales Engineer. Or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70744

YOU CAN BE SURE...IF IT'S

Westinghouse

Helping the industry meet its growing loads

Machines that think help push back frontiers of engineering

In the same way that machines are relieving 20th century man of many of the physical burdens he has borne for centuries, so, too, are they taking over many of the tedious, time-consuming mental tasks.

Westinghouse is proud of its leadership in analytical facilities. Typical of this leadership is the world's largest and most modern a-c network calculator, installed at the Westinghouse East Pittsburgh works. The new unit is the 36th calculator in the United States of which Westinghouse has built the majority. Any customer may use this board to help solve his problems.

One of the newest uses for the a-c board is in the economic dispatch of electric power. While utilities generally want to use their most efficient stations when load is under 100% of capacity, power transportation costs must be considered. Due to system losses, it is often cheaper to use a less efficient station closer to the load. In view of this, many power companies are making and using the results of economic dispatch studies. The a-c board is of great value in such cases in providing the correct loss formula. As the increasing complexity of power system interconnections makes new demands on utilities, the a-c board becomes even more valuable.

Other analytical facilities available at Westinghouse include many types of digital computers and analog computers. These modern research tools back up the design of all major Westinghouse products for the electrical industry. They reflect the Westinghouse attitude that every facility of modern science should be put to work to help meet America's growing electrical load—quickly and at lowest cost.

J-97188

YOU CAN BE SURE...IF IT'S Westinghouse

Calculator Availability

Westinghouse has been building *and selling* machines that "think" for over a quarter of a century. In addition, the analytical facilities of Westinghouse at East Pittsburgh are available on a rental basis, for use in solving your system's problems.

Network Calculator

Equipment available for your use includes the new a-c network calculator . . . the world's largest, with 36 generating stations and 580 circuits for use on very large system studies. For increased flexibility it has two control desks, so it can be split into one calculator of 24 stations and the other of 12. Thus it is possible to run studies on two systems concurrently.

The "Anacom"

Dr. E. L. Harder, Director of the Analytical Section, calls Westinghouse-built analog computers, "Anacoms". They make possible the solution in a few hours of problems that would take weeks or even years to solve by ordinary means.

Economic Dispatch Computers

One of the most recent developments in the field of electronic brains is the economic dispatch computer. Such computers, now being built and sold, can be used directly in the dispatching office to show the correct dispatch at all times. Since the computer can be kept continually up to date with system costs and availability of units, great numbers of precalculated dispatch curves with the means for modifying them for different conditions can be eliminated. Savings through proper use of the economic dispatch computer have been estimated at over $50,000 per year per thousand megawatts of generation on systems with extensive transmission.

Further details on Westinghouse analytical facilities can be supplied by your Westinghouse sales engineer—or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

Young Heads Utility

Calvin Young has been elected president and chief executive officer of West Texas Utilities Co of Abilene, Tex. Advancing from the vice presidency, Young succeeds Price Campbell who has become chairman of the board of the utility, a subsidiary of Central & South West Corp, Wilmington, Del.

The new president became associated with WTU in 1924 as assistant to Price Campbell who was then vice president and general superintendent. In this capacity Young was given responsibility for substation construction. In 1935 he was advanced to chief engineer. Young was elected vice president and a director of the utility in 1953 and assistant to the president in 1954.

After receiving a bachelor's degree in electrical engineering from Alabama Polytechnic Institute in Auburn, Young went to Massachusetts Institute of Technology where he earned a graduate electrical engineering degree. Joining General Electric Co, he completed the Schenectady test course and served in Dallas for a short period in 1923 as a service engineer.

CALVIN YOUNG

Brown Co Names Top Executives

A. E. H. FAIR

Brown Co has elected A. E. Harold Fair president and Stuart W. Skowbo vice president and treasurer. For the past year Fair has served as executive vice president, and Skowbo has been treasurer of the company, manufacturer of the Bermico line of fibre conduit.

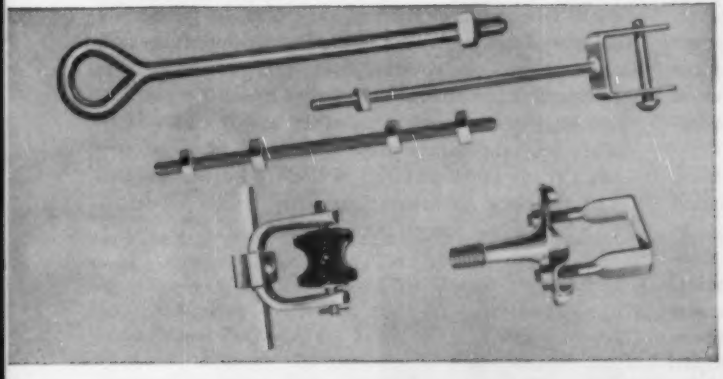
Fair has played a prominent role in the development of new processes in the pulp and paper fields. He developed the first wood fibre dielectric condenser paper and also evolved a special process for the adding of fillers to paper.

A graduate of Royal Military College of Canada and University of Toronto, Fair entered the pulp and paper field in 1922 with Lincoln Pulp & Paper Co in Merritton, Ontario. He served as vice president of Alliance Paper Mills, Ltd, and Don Valley Paper Co. In 1946 he was named president of these Canadian firms.

Skowbo joined General Electric Co after receiving a master's degree in industrial management from University of Iowa. He served in GE's financial and cost departments at Schenectady, N. Y., and Lynn, Mass., for about 15 years. Skowbo has been associated with Coolerator Co, Duluth, Minn., as vice president and controller and with Marshall-Wells Co, also of Duluth, as controller and chief financial officer.

S. W. SKOWBO

Reduce hardware replacement costs with USS COR-TEN Steel



- ***that is 50% stronger****
- ***has 4 to 6 times the resistance to atmospheric corrosion***
- ***will last far longer than carbon steel***

WITH MODERN PRESERVATIVE TREATMENT your poles now will last at least 40 years. In contrast, ordinary pole line hardware will frequently rust out in half that time or less, must be replaced at least once—sometimes twice—during the life of the pole. That can run into big money.

Your own records will show you that it's not the hardware *but the cost of replacing it* that makes replacement a costly business. It takes time to get the crew to the job, to arrange for power interruptions, to replace the old hardware, to reload the truck and move on. Compared to the cost of the labor, the new hardware actually costs very little.

The obvious solution is to install steel hardware that will require less frequent replacement—or no replacement at all—keeping it ideally balanced with the service life of the pole.

USS COR-TEN Steel offers a logical means of obtaining this highly desirable result.

Because of its proved high resistance to atmospheric corrosion — the arch enemy of pole line hardware — COR-TEN Steel, with a coating of galvanizing, can confidently be expected to match the service life of a creosoted pole in rural, industrial, or marine atmospheres. And COR-TEN's 50% higher yield point is also effective in maintaining service life before minimum strength requirements are reached.

**50% higher yield point.*

Here are typical examples of USS COR-TEN Steel pole line hardware that has been installed during the last few years for use in industrial areas where its advantages are perhaps most marked. It is offered in a wide variety of items by prominent hardware manufacturers.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS COR-TEN HIGH Strength STEEL

USS

9-1091

UNITED STATES STEEL

Research for New Savings in Power Plant Operations

Steam purity has been advanced to such high levels by B&W equipment that new techniques in measurement have become necessary. In the laboratory, B&W research engineers have pioneered in the use of radioactive isotopes as a precision measuring device.
Re: CLEAN TURBINES

CAN TURBINE DEPOSITS BE REDUCED?

Recognizing that turbine deposits, notably silica, become more troublesome as operating pressures increase, B&W is continuing its intensive research and engineering development efforts toward further improvement in steam purity. These efforts have already produced important practical results, such as maintaining peak turbine efficiency with less frequent turbine outage for cleaning.

B&W Cyclone Steam Separators, steam scrubbers, and the more recently developed B&W Steam Washers—which utilize the principle of silica absorption from steam by intimate contact with condensate or feedwater—afford sound, economical answers to some of the problems of turbine deposits. Already installed in a number of important power boilers, the Steam Washer was developed after intensive B&W study of the mechanics of silica carry-over.

A discussion of "Selective Silica Carry-Over In Steam"—ASME Paper No. 55-SA-19—is available on request. Its findings are characteristic of the advanced, creative work carried on at B&W's large, fully-integrated Research Center in Alliance, Ohio. B&W's research engineers, for example, pioneered the use of radioactive isotopes for the determination of impurities carry-over. And a large part of this comprehensive research program—encompassing not only steam purity but every major obstacle to more efficient combustion and steam generation—has already been reflected in B&W's boiler designs. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

BABCOCK & WILCOX

BOILER DIVISION

G-712

Fowler Named Day & Zimmerman VP

A. L. FOWLER

Allen L. Fowler has been elected a vice president of the engineering firm of Day & Zimmerman, Inc, of Philadelphia.

Fowler has been associated with Day & Zimmerman nearly 30 years. He has served as a director of the firm since 1946 and has been manager of the reports department for the past ten years.

The new vice president attended St. Johns College in Annapolis, Md., and was graduated from the Evening School of Accounts and Finance of the University of Pennsylvania.

Miller Co Promotes

B. G. TREMAINE, JR

Burton G. Tremaine, Jr, executive vice president of Miller Co since 1951, has been elected president to succeed Burton G. Tremaine who becomes chairman of the board.

Henry J. Millington, assistant to the executive vice president, has been elected vice president and manager of the company's Illuminating Division.

John L. Busey has been elected a director. Last fall he retired as vice president in charge of marketing services for General Electric Co.

Miller Co manufactures commercial and industrial lighting equipment and produces phosphor bronze and brass strip and coil.

H. J. MILLINGTON

PERSONAL BRIEFS

Harold N. Walker has been named to United Nations' technical advisory board to design dams and hydro powerhouses in New Delhi, India. He has received a year's leave from his duties as chief of the design branch for Portland, Ore., district, Corps of Engineers. Succeeding Walker is **Lewis E. Knerr,** assistant chief of the Engineering Division.

Dr G. Wesley Dunlap, General Electric Co's manager of instrument and nuclear radiation engineering services, has been appointed visiting professor at Massachusetts Institute of Technology for 1955-56. Dr Dunlap succeeds **Dr Robert A. Ramey, Jr,** of Westinghouse Electric Corp, in holding the Edwin Sibley Webster Professorship of Electrical Engineering.

Dr Truman S. Gray, associate professor of engineering electronics at Massachusetts Institute of Technology, has been named consultant on nuclear energy by Brown Instruments Division of Minneapolis-Honeywell Regulator Co. Dr Gray is secretary of the committee on nucleonics of American Institute of Electrical Engineers.

Elliott Co, Jeannette, Pa., has appointed **Captain Max Schreiner, USN** (retired), executive engineer in charge of engineering of the company's Turbine, Compressor, Supercharger, and General Apparatus Divisions. Previously he was commanding officer and director of the U. S. Naval Boiler & Turbine Laboratory in Philadelphia.

Pate R. Hall, manager of DeRidder Division, Central Louisiana Electric Co, Inc, since 1931, has retired . . . Florida Power & Light Co has announced the retirement of **James D. Newman,** manager, Bradenton district, since 1930.

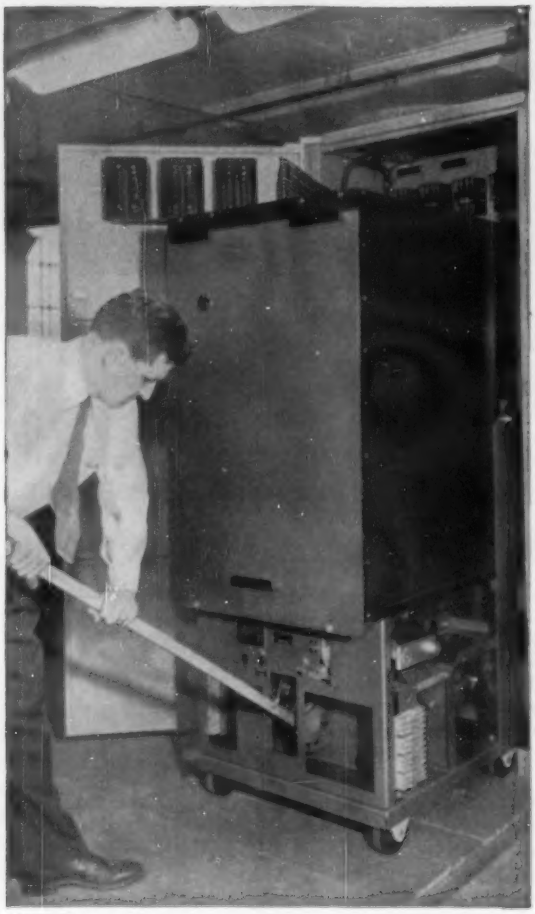
Utah Power & Light Co's publications editor, **Grant Pendleton,** has been named "Industrial Editor of the Year" by the Industrial Editors of Utah. Pendleton is editor of UP&L's "Circuit" magazine.

Howard Hicks has been appointed residential and rural sales manager of Carolina Power & Light Co to succeed **Thomas B. Smiley** who retired Sept. 2. Filling Hicks' post as Northern Division sales manager is **R. H. Pearce.**

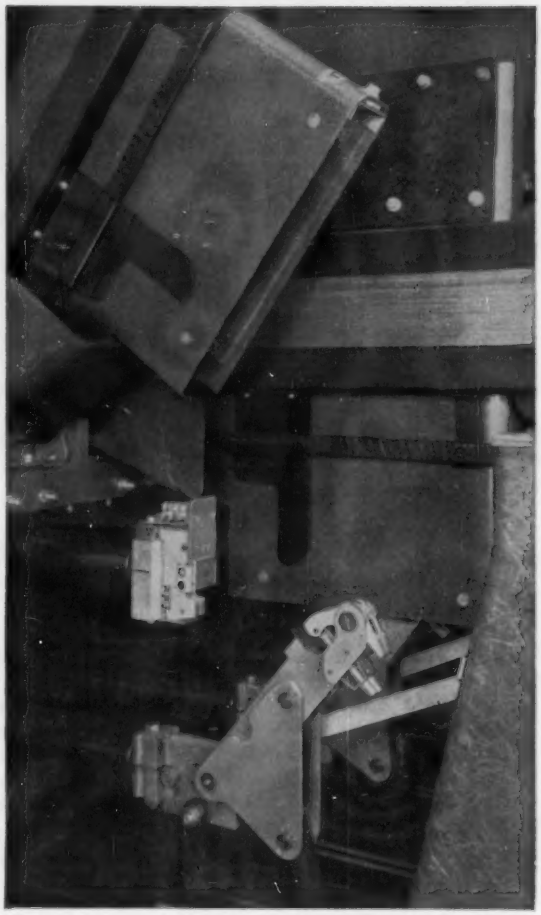
OBITUARY

Judge Frederick J. Dunn, 75, retired vice president and general counsel of New England Electric System, died at Newton, Mass. He was a former president of Gardner (Mass.) Electric Light Co and vice president of Green Mountain Power Corp and Massachusetts Utility Associates. After his retirement Judge Dunn remained a director of a number of NEES affiliates.

Come to the plant and going into I-T-E Metal-



1. Horizontal drawout design. Even heavy 15 kv circuit breakers, such as this one, roll out easily on permanently attached wheels. Breaker compartment is full-depth, one-piece welded frame, retains shape, permits lifting as a unit.

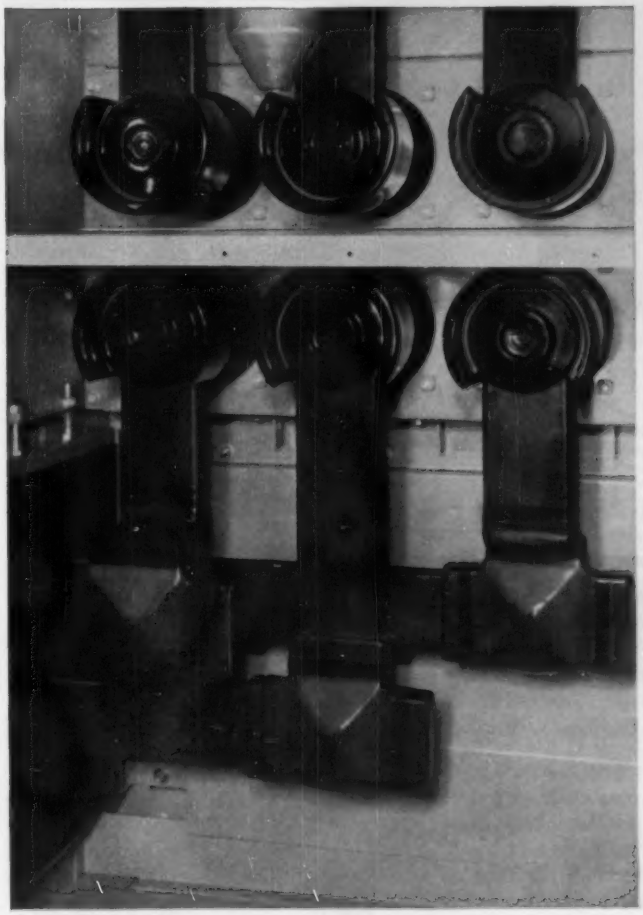


2. Positive arc interruption. On 15 kv breakers, double-coil, closed-iron magnetic blowout circuit draws arc rapidly into overhead quenching chute. Pivoting arc chutes, shown above, facilitate maintenance. Note sturdy contact assembly.

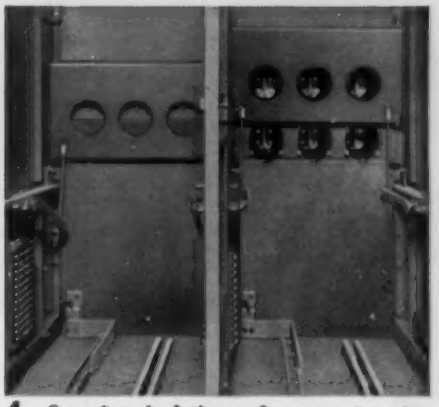
Discover in these pictures just a few of the extra-value, quality features in all I-T-E Metal-Clad Switchgear. They were taken right here in the I-T-E plant and show the equipment in process of manufacture.

If you're planning new construction where you will need metal-clad switchgear, take a tip that can help you make the very most of your investment dollar: Visit the I-T-E plant here in Philadelphia. See the quality features actually being built into the equipment—quality that keeps I-T-E Switchgear performing more safely and dependably all the years it serves you. See the scenes shown on these pages, plus dozens more like them. See the extra value in I-T-E Switchgear that you won't find in any other

see the extra value Clad Switchgear



3. Bus rigidly braced, heavily insulated. View into rear of 15 kv compartment shows porcelain disconnect bushings and bus supports which insulate and hold the bus in alignment during short circuit stresses. Steel paneling throughout forms isolated compartments.



4. Superior isolation of compartments. Gravity-type shutters, shown closed at left and blocked open at right, isolate primary terminals from breaker compartment.

5. Fine, durable finish. All panels and doors are sanded, bonderized and cleaned with spirits, then painted with three coats of enamel—baked on and rubbed down.

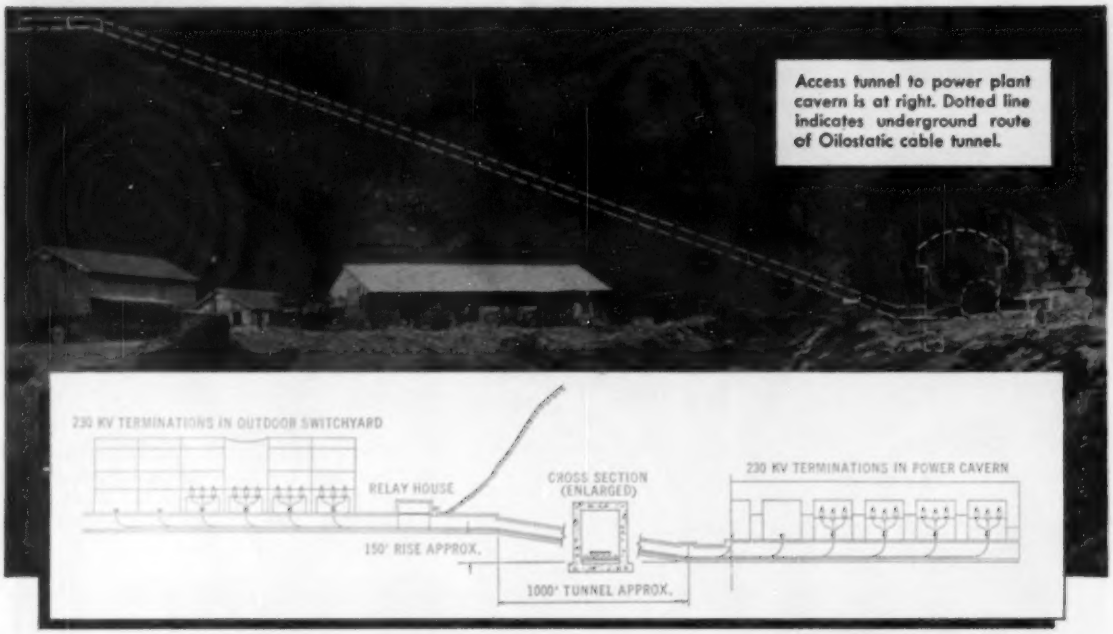
make. I-T-E Metal-Clad Switchgear is available in ratings through 13.8 kv, 500 mva.

For details, contact the I-T-E field office nearest you. Look in your classified directory under "Electric Equipment." I-T-E Circuit Breaker Company, Switchgear Division, 19th and Hamilton Sts., Philadelphia 30, Pa.

I-T-E
CIRCUIT BREAKER COMPANY
Switchgear Division

ANOTHER OKONITE FIRST:

the first American-built 230 kv Oilostatic high-pressure oil, pipe-type cable system


Access tunnel to power plant cavern is at right. Dotted line indicates underground route of Oilostatic cable tunnel.
230 KV TERMINATIONS IN OUTDOOR SWITCHYARD
RELAY HOUSE
CROSS SECTION (ENLARGED)
230 KV TERMINATIONS IN POWER CAVERN
150' RISE APPROX.
1000' TUNNEL APPROX.

Schematic Cross-Section of 230 kv Oilostatic Cable System Cubatao Underground Station, Sao Paulo, Brazil.

Okonite's leadership in the development of high-tension cables is again demonstrated by the manufacture of a 230 kv Oilostatic cable—the first American-built 230 kv high-pressure, pipe-type cable system. This cable, recently shipped, was ordered in March, 1951, for installation at the Cubatao Underground Power Plant of the Sao Paulo Light and Power Company Limited, Sao Paulo, Brazil.

The underground power plant, utilizing a hydrostatic head of 2,300 feet, is located in a cavern 600 feet inside a mountain. Four Oilostatic circuits of single conductor, 500 MCM, 0.835-inch paper-insulated, shielded, D-shaped copper wire armored cables will carry the output of the four 65,000 kw generators being installed. A separate tunnel from the power plant to the switchyard is provided for the cable circuits and the control cables.

Oilostatic high-pressure oil, pipe-type systems are self-supervising, easy to install and require negligible maintenance. For complete installation and operation information, write to The Okonite Company, Passaic, N. J.

Available with either copper or aluminum conductors

OKONITE OKONITE SINCE 1878 ***insulated cables***

2591

MEETINGS CALENDAR

An extended list of coming meetings appears in the last issue of each month

SEPTEMBER

SECOND WESTERN AREA DEVELOPMENT CONFERENCE—Sponsored jointly by Stanford Research Institute, the American Industrial Development Council and the Pacific Northwest Trade Association, Multnomah Hotel, Portland, Ore., Sept. 8-9.

ROCKY MOUNTAIN ELECTRICAL LEAGUE—Annual Fall Convention, Grand Teton Lodge, Jackson Hole, Wyo., Sept. 11-14.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS—2nd Electrical Conference of the Petroleum Industry, Shamrock Hotel, Houston, Tex., Sept. 12-14; Industrial Electronics Conference, Rackham Memorial Auditorium, Detroit, Sept. 28-29.

ILLUMINATING ENGINEERING SOCIETY—National Technical Conference, Cleveland, Ohio, Sept. 12-16.

INSTRUMENT SOCIETY OF AMERICA—10th Annual Conference and Exhibit, Shrine Exposition Hall and Shrine Auditorium, Los Angeles, Sept. 12-16.

* **EDISON ELECTRIC INSTITUTE**—Residential Promotion Committee, Headquarters, New York, Sept. 12-13; Accounting Division Organization Meeting with American Gas Association, Netherlands Plaza Hotel, Cincinnati, Sept. 13-14; Commercial Division Executive Committee, Headquarters, New York, Sept. 14; Farm Group Committee organization meeting for 1955-56, Hotel Roosevelt, New York, Sept. 15-16; Street Lighting Committee, Cleveland, Ohio, Sept. 18-19; Industrial Relations Round Table Conference, Drake Hotel, Chicago, Sept. 19-21; Industrial Power & Heating Group, EEI Headquarters, New York, Sept. 22-23; Northeastern Area Dealer Coordination Workshop, New Ocean House, Swampscott, Mass., Sept. 22-23. Purchasing and Stores Committee, EEI Headquarters, New York, Sept. 26; Transmission and Distribution Committee, Jung Hotel, New Orleans, Sept. 29-30.

ASSOCIATION FOR COMPUTING MACHINERY—Annual Meeting, University of Pennsylvania, Sept. 14-16.

PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS—37th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, West Va., Sept. 15-18.

SYMPOSIUM OF ELECTRONIC AUTOMATION—University of Pennsylvania, Irvine Auditorium, Philadelphia, Sept. 19-20.

SOCIETY OF INDUSTRIAL PACKAGING AND MATERIALS ENGINEERS—10th Anniversary Meeting, Kingsbridge Armory, New York, Sept. 19-22.

* **PENNSYLVANIA ELECTRIC ASSOCIATION**—Annual Meeting, Benjamin Franklin Hotel, Philadelphia, Sept. 20-21; Transmission & Distribution Committee, Fort Bedford Inn, Bedford, Pa., Sept. 28-30.

NATIONAL INDUSTRIAL CONFERENCE BOARD—Marketing Meeting, Waldorf-Astoria Hotel, New York, Sept. 21-23.

MISSOURI VALLEY ELECTRIC ASSOCIATION—Accounting Conference, President Hotel, Kansas City, Mo., Sept. 22-23.

* **NORTHWEST PUBLIC POWER ASSOCIATION**—Accounting Section, Winthrop Hotel, Tacoma, Wash., Sept. 22-23.

SOUTHEASTERN ELECTRIC EXCHANGE—Engineering & Operation Section, and Subcommittees, Charlotte Hotel, Charlotte, N. C., Sept. 22-23.

NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS—Pacific Zone, Annual Convention, Empress Hotel, Victoria, B. C., Sept. 25-28.

SYMPOSIUM ON ELECTRONIC AUTOMATION—University of Pennsylvania, Irvine Auditorium, Philadelphia, Sept. 26-27.

* **ASSOCIATION OF IRON AND STEEL ENGINEERS**—Annual Convention, Hotel Sherman, Chicago, Sept. 26-29.

ATOMIC INDUSTRIAL FORUM, INC—1st Trade Fair, Sheraton-Park Hotel, Washington, D. C., Sept. 26-30.

STANDARD ENGINEERS SOCIETY—4th Annual Meeting, Hotel Statler, Hartford, Conn., Sept. 29-Oct. 1.

OCTOBER

EDISON ELECTRIC INSTITUTE—Meter and Service Committee, Hotel Syracuse, Syracuse, N. Y., Oct. 3-5; Prime Movers Committee, Hotel Cleveland, Cleveland, Ohio, Oct. 3-5; Electrical Equipment Committee, Shoreham Hotel, Washington, Oct. 17-18.

NATIONAL ELECTRONICS CONFERENCE, INC—Hotel Sherman, Chicago, Oct. 3-5.

* **AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS**—Fall General Meeting, Morrison Hotel, Chicago, Oct. 3-7.

ELECTRIC COMPANIES PUBLIC INFORMATION PROGRAM—Workshop Conference, Chase Park Plaza Hotels, St. Louis, Missouri, Oct. 5-7.

* **IOWA UTILITIES ASSOCIATION**—8th Annual Management Conference, Hotel Fort Des Moines, Des Moines, Iowa, Oct. 10-11.

* **NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS**—Fall Meeting, Peabody Hotel, Memphis, Tenn., Oct. 14-15.

SOUTHEASTERN ELECTRIC EXCHANGE—Accounting Conference, Hotel San Carlos, Pensacola, Fla., Oct. 20-21; Sales Conference, Biltmore Hotel, Atlanta, Ga., Oct. 27-28.

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS—67th Annual Convention, Grove Park Inn, Asheville, N. C., Oct. 24-27.

* **PENNSYLVANIA ELECTRIC ASSOCIATION**—Meter Committee, Bedford Springs Hotel, Bedford, Pa., Oct. 13-14; Systems Operation Committee, Hotel Harrisburger, Harrisburg, Pa., Oct. 20-21, Prime Movers Committee, Clearfield, Pa., Oct. 20-21. Electrical Equipment Committee, Hotel New Yorker, N. Y., Oct. 27-28; Relay Committee, Pocono Manor Inn, Pocono Manor, Pennsylvania, Oct. 31-Nov. 1.

NOVEMBER

* **EDISON ELECTRIC INSTITUTE**—Taxation Accounting Committee, sponsored jointly with American Gas Association, Plaza Terrace Hotel, Cincinnati, Ohio, Nov. 3; Accident Prevention Committee, Beaumont Hotel, Beaumont, Tex., Nov. 13-18.

(Continued on page 44)

Meetings Calendar

(*Continued from page* 43)

*** PACIFIC COAST ELECTRICAL ASSOCIATION**—Business Development Section Annual Conference, Huntington-Sheraton Hotel, Pasadena, Calif., Nov. 3-4; Hawaiian Section Conference, Honolulu, Nov. 9-10; Administration Services Section Meeting, California Hotel, Fresno, Calif., Nov. 16-17.

*** AMERICAN SOCIETY OF MECHANICAL ENGINEERS**—Diamond Jubilee, Congress, Hilton & Blackstone Hotels, Chicago, Nov. 13-18.

*** WISCONSIN UTILITIES ASSOCIATION**—Electric & Gas Section, Schroeder Hotel, Milwaukee, Nov. 21-23.

*** AIR CONDITIONING & REFRIGERATION INSTITUTE**—9th Air Conditioning & Refrigeration Exposition, The Auditorium, Atlantic City, N. J., Nov. 28-Dec. 1.

* Additions this week

EEI's Technical, Sales Meet Set

A technical and sales conference bridging the entire field of industrial electric heating will be held in Cincinnati Feb. 6-10, 1956, the Edison Electric Institute has announced. Enrollment will be limited to about 150.

Purpose of the conference is to present latest technical data, sales aids, and sales training ideas to industrial heating specialists and power salesmen. Sessions also will provide opportunities for electric heating equipment manufacturers and electric utilities to exchange information.

A new session on markets and selling — believed to be of special interest to power salesmen and supervisors — will cover the principal ways of developing a successful sales campaign.

Technical programs will touch upon such relatively new subjects as titanium, zirconium, vacuum melting, vacuum heat treating, space heating, and industrial use of the heat pump. Case histories will be cited, and speakers will point out how the job was sold.

Intake Completed for NEES Plant

Intake structures and generator flooring (above) have been completed at New England Electric System's new 150,000-kw Samuel C. Moore Station.

Located near Littleton, N. H., the new station is a part of the development program for the Connecticut River's Fifteen Mile Falls section. Net head at the plant will be 150 ft with the dam impounding 115,000 acre-ft of usable storage.

Four 37,500-kw generators are scheduled for operation by the fall of 1956 when the plant will be complete. According to latest estimates, total project cost will be $45 million.

Review of Columbia Basin Undertaken by Engineers

The Corps of Army Engineers has begun work on a two-year project to review its 1948 "308" report, the comprehensive blueprint for development of the Columbia River Basin's water resources. Authorized by the Senate Public Works Committee, the review will cost about $750,000 of which $300,000 is available this year.

Investigation will be aimed particularly at present requirements of flood control, including consideration of downstream effects of Canadian storage potentials; navigation; and the part generation may be expected to play in supplementing the hydroelectric potential of the basin in meeting the continued power load growth. The study will not delay any projects now under construction or those on which active construction planning is under way.

Brig Gen L. H. Foote, North Pacific division engineer, will supervise the review.

Vogel Says TVA Needs New Headquarters Site

Tennessee Valley Authority is on the hunt for new headquarters, TVA Chairman Herbert D. Vogel has revealed.

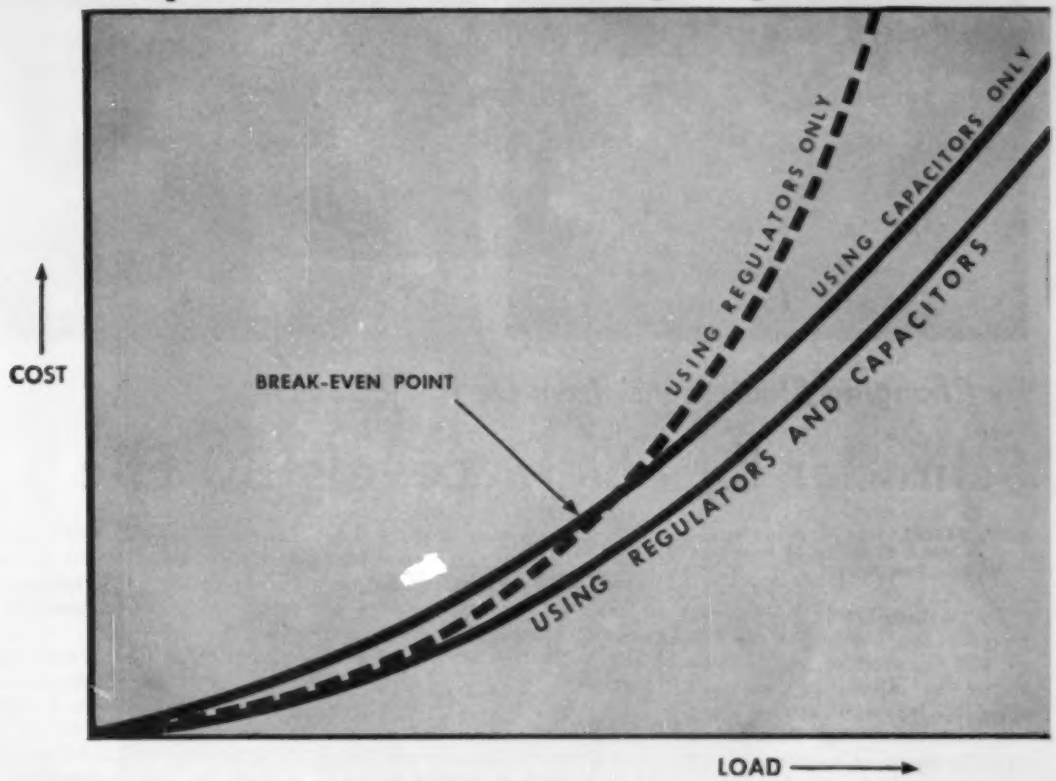
At a recent meeting with Alabama officials Vogel said Knoxville, TVA headquarters, is "suitable." But he added that a new headquarters site must be found because present facilities are overcrowded.

Vogel opposed Muscle Shoals, Ala., as a possible TVA capitol because of inadequate transportation facilities.

The act creating TVA contained a clause which said the headquarters should be in the vicinity of Muscle Shoals. Vogel has referred to Muscle Shoals, Chattanooga, and Knoxville as a "great tripod" of TVA activities.

OPERATION VOLTAGE REPORT NO. 3

Key facts in the cost of voltage regulation



Conclusion: AT ANY LOADING....

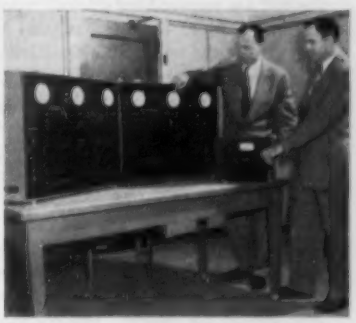
REGULATORS PLUS CAPACITORS COST LESS

A critical examination of the functions of feeder voltage regulators and shunt capacitors reveals that each has particular benefits prescribing their use. Hence, when using these equipments together, the individual advantages complement each other to give the best voltage control and increased load capability.

The important question then becomes, "How do the costs compare?" It can be seen in the figure above that, at light loads, the use of voltage regulators alone is more economical than capacitors alone. Conversely, at heavier loads past the "break even" point, capacitors are more economical when used exclusively. But, at *all* loads, the combined use of these equipments represents the least expensive method of proper voltage control.

When system parameters, loadings, costs of equipment, and evaluated losses change—the result remains the same. Regulators and capacitors used together not only provide superior voltage control and greater load capability . . . but do it at less cost.

This is the third in a series of reports describing the results of a comprehensive study of voltage on feeders. For a complete discussion, contact your G-E Apparatus Sales Engineer. General Electric Co., Schenectady, N. Y. 645-3



Portable demonstrator being used by G-E Engineers R. M. Butler and D. R. Samsen to show effect of capacitors and regulators under variety of feeder load conditions.

GENERAL ELECTRIC

BEFORE . . .

AFTER . . .

By Changing Fluorescents from Dc to Ac . . .

Schrader Ups Light Levels 30 Ft-c

H. J. PETERS, Sales Engineering Bureau, Consolidated Edison Co of New York, Inc, New York, N. Y.

For the many benefits available, A. Schrader's Son, a division of the Scovill Mfg Co, Brooklyn, N. Y., is replacing the existing dc fluorescent office lighting with fixtures using longer fluorescent lamps which will be on utility-supply ac operation instead of private-supply dc operation.

Standby Capacity Increased . . . The total new general office lighting installation will be 522 four-lamp fixtures for about 45,000 sq ft of floor area.

The utility's ac service to the industrial plant has been enlarged to supply the 167 kw required for this relighting. About 59 kw of lighting has been installed with the balance to be added in the next two years.

The new lighting installation consists of 25-in.-wide, 96-in. louvered fixtures in 16-ft runs. Each fixture utilizes four standard cool white slim-line lamps.

New Ceiling Level . . . The lighting units are suspended 30-in. overall so that the bottom of the fixture is even with the ceiling beams. The result is, in effect, the establishment of a new ceiling level which hides most of the loft-type ceiling construction. Louvered shielding is 25 deg crosswise and 35 deg lengthwise of the fixture.

This dc/ac lighting changeover is the result of a proposal by Consolidated Edison Co of New York, Inc, outlining the advantages (see box) to be gained by ac fluorescent lighting and a desire by the utility to serve the manufacturer.

Bonus Benefits . . . Those operational advantages are maintenance-wise, and are in addition to benefits normally gained through office relighting, such as:

- Improved quality and intensity of lighting to increase the office workers' efficiency and comfort.
- Greatly improved appearance of the office.
- Higher employee morale.

Carefully Planned . . . Lighting recommendations, complete with floor plans were prepared. IES recommended lighting levels were followed for the seeing tasks involved.

As a result the tire-valve manufacturer is installing modernized lighting on three office floors. Luminaires already have been put on one floor. Here the maintained illumination level is 40-50 ft-c. The dc illumination was less than 20 ft-c.

Pretested for Maintenance . . . Before the equipment was selected, three trial bays of different fixtures were set up and tested for ease of maintenance—particularly ease of lamp and ballast replacement and cleaning procedures.

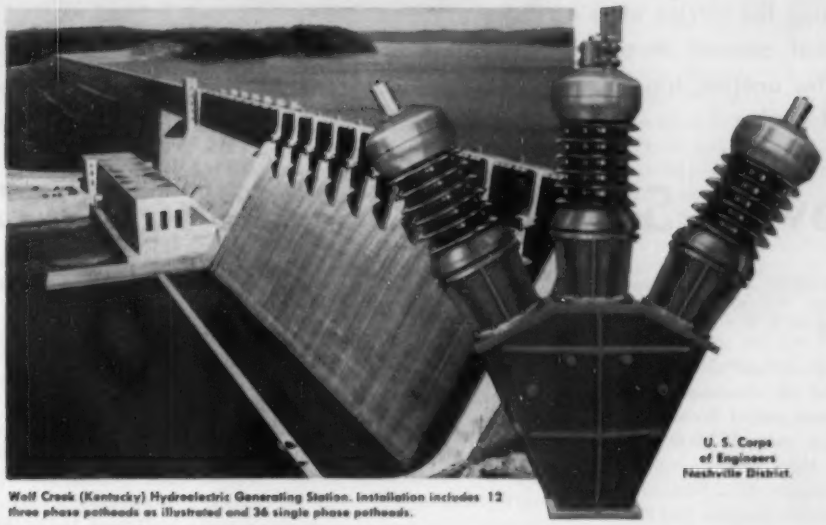
Resulting Advantages Include . . .

1. **Electrical loss reduction. Resistive ballasts are no longer needed.**
2. **Conditioning or seasoning lamps is not necessary on ac circuits.**
3. **Instant starting is obtained. Need for starters eliminated.**
4. **Manual reversing of current polarity several times a day is obviated. (Polarity is reversed to obtain satisfactory lamp life on dc operation and to compensate for drift, a phenomenon which occurs particularly in 4-ft. tubes. In drift, the column of light gradually diminishes as an electron cloud gathers at the lamp cathode, plus a 60-sec waiting period to dispel the electron cloud.)**
5. **General lighting reliability was improved. Lamps stay lit in drafts. Blinking and erratic operation was stopped.**
6. **Customer is profiting by improved design of fluorescent lamps and their auxiliary components. This is important. The fluorescent lamp is primarily designed for ac service and future developments will move in this direction.**

G&W 26,000 volt

"ATA" POTHEADS

for high pressure oil or gas generator cables



U. S. Corps of Engineers Nashville District.

Wolf Creek (Kentucky) Hydroelectric Generating Station. Installation includes 12 three phase potheads as illustrated and 36 single phase potheads.

High pressure (200 p.s.i.) oil or gas pipe cables for large generator leads have proved quite satisfactory from an engineering and economical standpoint. For terminating such cables, G&W is regularly furnishing Type "ATA" three phase potheads as illustrated for two conductors per phase in sizes up to twin 1750 Mcm. HP oil and twin 1500 Mcm. HP gas.

The oil or gas filled steel pipe enclosing the six paper insulated conductors, is joined to the base of the body, which is reinforced welded steel with non-magnetic steel flanges on top. The highest quality porcelain tubes withstand test pressures considerably in excess of the operating pressure. Non-magnetic stainless steel top caps and bottom sleeves are attached to the gasketed tapered ends of the porcelain tubes by screws threaded into bronze rings cemented to the porcelains.

Stress relief cone material and complete installation instructions are included with Type "ATA" potheads. Order direct or through your cable manufacturer.

50th ANNIVERSARY G&W 1905 1955

G & W ELECTRIC SPECIALTY CO.

7780 Dante Avenue, Chicago 19, Illinois

Representatives in principal cities of U.S.A.
In Canada—Powerlite Devices, Ltd., Toronto, Montreal & Vancouver

AT-542

METERING
Operation

Reading the meter but not disconnecting the service when a residential account is closed eliminates another trip to reconnect service

Leaving Services 'Hot' Saves $52,000

O. W. JACKSON, Manager, Customer Record Dept, Potomac Electric Power Co, Washington, D. C.

Leaving residential services energized after the customer has vacated the premises netted Potomac Electric Power Co over $52,000 last year. Most of these savings were due to the elimination of a field trip to reconnect the service and read the meter. Now the final reading for the old customer serves as the first reading for the new one. The practice also improves public relations and service.

The savings would be even greater if all new customers would notify the company when moving into premises. When they don't, extra clerical and field work (amounting to 27.5% of the gross savings in 1954, are necessary. However, experience with the practice has been so good that Pepco is considering estimating final readings.

The practice of leaving residential services "hot" was considered before World War II as a means of saving money and because of the difficulty in contacting customers and gaining access to meters. In Pepco's area an unusually large percentage of wives also are employed, and many homes are closed during the day.

Adapted from a paper presented at the SEE Engineering & Operation Section meeting in New Orleans.

Decision to adopt the practice was made in June 1943 to reduce manhours and vehicular travel. Savings in manpower were immediately apparent.

Orders for closing residential-service accounts are accepted by telephone without further confirmation. A special trip is made to obtain the final meter reading but not to disconnect service. The final reading also serves as initial reading for new customer.

When a customer moves into a premise without notifying the company, use of electric service is detected during the monthly meterbook audit. A form is prepared showing the consumption from the date of the previous customer's final reading and is checked and eliminated if an order has been received in the interim. If an order has not been received, the form is forwarded to the business office and handled as follows:

1. Representatives attempt to telephone the occupant, using the Telephone Co Street Address Directory. Through telephone contacts with owners, managers, and agents the name of the occupant is secured together with date of occupancy.

2. If telephone contact fails, a letter addressed "To the Occupant" requests an order by telephone or by an enclosed, postpaid postcard. The letter also states that failure to comply within five days will result in disconnection of service.

3. If no order is received, service is disconnected unless the meter department representative secures an order.

4. When use of service involves an unusually large consumption or long interval, the cases are referred to the adjustment section for investigation.

During 1954, 150,000 orders were handled for residential customers. Of this number about 36,000 were simultaneous closing and opening of accounts. The remainder consisted of 56,500 orders to reopen closed accounts and 57,500 to close accounts.

In the 57,500 cases the readings taken when former occupants moved were usually used to start the billing for new customers. By not disconnecting the meters on the final-reading trips, an estimated $9,975 was saved. Eliminating trips for reconnecting services saved an additional $62,735 in overhead, labor, and transportation. Thus the gross savings totalled $72,-710, of which 20.7% was transportation and 79.3% labor.

This saving is conservative because of certain intangibles including the following items which were eliminated with the present practice:

1. Special trips to provide service to customers who forgot to notify the company before moving in.

2. Interrupting the flow of work for appointments to gain access to locked premises.

3. Handling calls from customers who fear service will not be connected as promised.

4. Need for maintaining a labor force until 9 PM for handling orders after normal working hours.

The number of customers who moved into residences without notifying Pepco averaged 1,200 per month during 1954. Orders from about 1,000 were subsequently secured, but the remaining 200 had to be disconnected. Cost to secure these orders amounted to $14,626, of which $10,993 was clerical and supplies and $3,633 was field labor and travel.

In addition to these new costs, leaving the service energized resulted in unbilled consumption totalling 231,000 kwhr last year. When priced at the average residential rate of 2.35¢ the unbilled kilowatthours amount to $5,428. Adding this to the clerical and field work cost gives a total cost of $20,054. This figure subtracted from the gross savings of $72,710 leaves an annual net savings of $52,656.

Promotes Better Public Relations

This saving is gratifying, but possibly even more important are the better customer service and relations. Since the practice was inaugurated, response from customers, property owners, and managers has been very favorable. Customers from other areas also frequently comment favorably.

Other benefits have been realized. The first and fifteenth of each month no longer represent an "all out" clerical and field effort to get all services disconnected and reconnected. There are no crews working after hours, no frantic calls from customers, and no diversion of manhours from other important jobs.

One disadvantage of leaving services energized is the legal liability. This may arise in connection with local electrical codes or damage to property or persons resulting from service being available after it was ordered discontinued. The company has not encountered any difficulty of this type.

Estimating the meter readings for final residential bills rather than actually reading meters is being studied. Naturally, this procedure would not entirely eliminate the reading of meters for final billing, and adjustments would have to be made when a subsequent reading showed the customer had been overcharged.

Present thinking is that final bill readings could be accurately estimated on the basis of the record of the customer's prior usage. If the disconnection date is not more than two days prior to the regular meter reading date, the regular monthly reading would be used as the final bill reading. The estimated final reading for the old customer would become the beginning reading for the new one.

Preliminary studies indicate that the advantages of this practice to both the company and its customers, warrant it being given serious consideration.

Repeal of Wyoming Line Limits Asked

Sen Frank A. Barrett (R-Wyo.) has asked the Senate Appropriations Committee to lift the two-year-old restriction on construction of power transmission lines to Lovell from Yellowtail Dam in Montana.

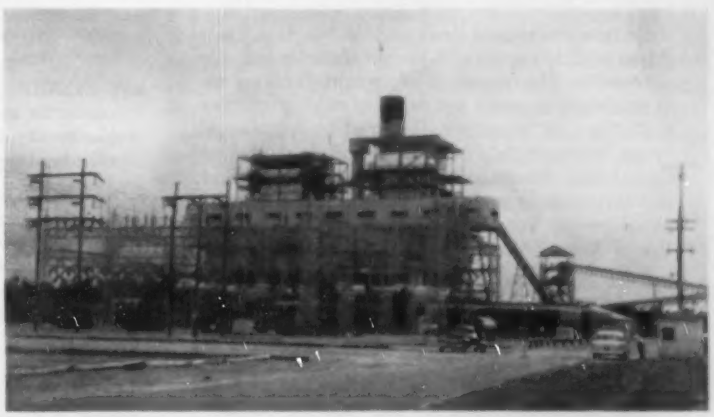
If the restriction is removed, he said, Montana Power & Light Co will build lines from Billings, Mont., to Yellowtail Dam and thereafter be in a position to supply power over new lines to Casper in mid state and northern Wyoming areas.

"Under such an arrangement," he added, "power shortage in our state would be relieved until such time as Pacific Power & Light Co completes its proposed steam plant in Wyoming and until such time as Yellowtail Dam is completed."

Executives of PP&L have estimated Wyoming will face a critical power shortage by the end of 1956 unless new sources are developed. They claim hydro potential is exhausted in the state.

Pacific has said it is working with Reynolds Metals Co in a proposed $200-million aluminum reduction mill and steam power plant at Lake De-Smet, where there are vast quantities of bituminous coal. Pacific was considering a 300,000-kw plant that could cost as much as $50 million.

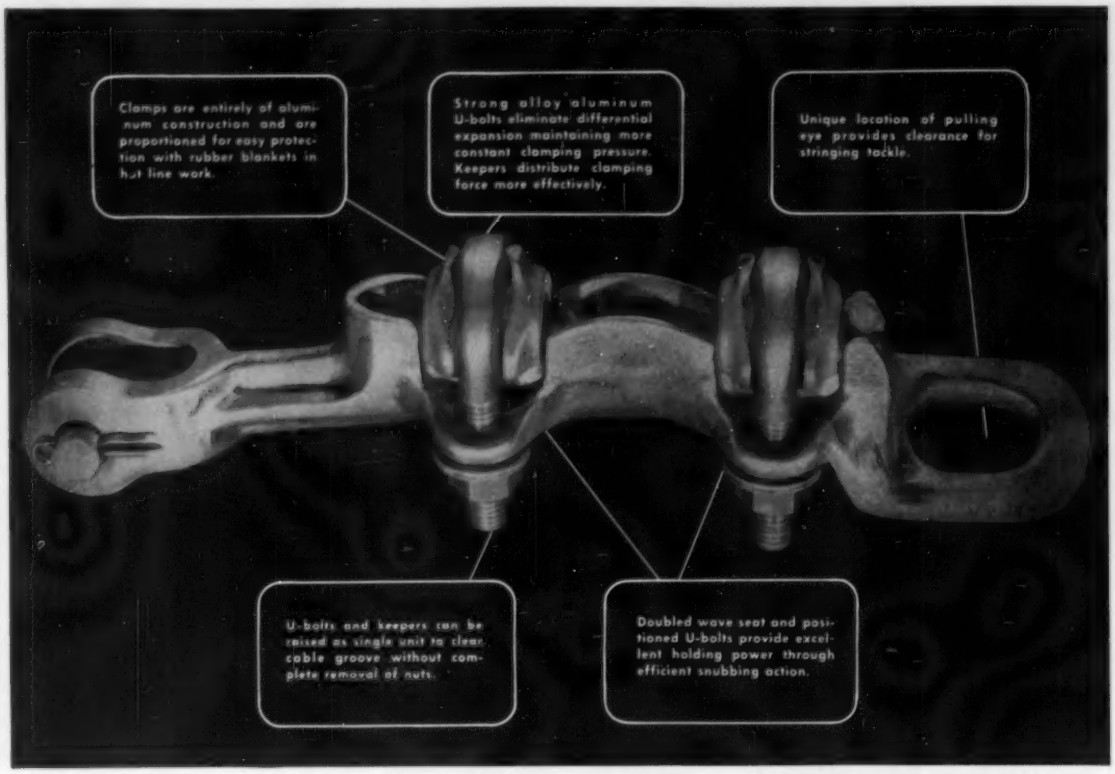
Senator Barrett said the Bureau of Reclamation has advised it can build an adequate transmission line with available funds, and the Budget Bureau has urged removal of the restriction.



Carolina P&L Plant Adds 223.8 Mw

The Louis V. Sutton Steam Plant (above) has added 223.8 Mw capacity to Carolina Power & Light Co's generating capacity. Dedicated last October, the station was not completed until recently. A microwave tower can be seen alongside the stack and rising above it.

CP&L spokesmen point out that the new plant at Wilmington, N. C., will produce seven times more annual dependable power than government-owned Kerr Dam on the Roanoke River near the Virginia-North Carolina boundary. The utility is involved in a Kerr Dam wheeling dispute with co-operatives.


Clamps are entirely of aluminum construction and are proportioned for easy protection with rubber blankets in hot line work.
Strong alloy aluminum U-bolts eliminate differential expansion maintaining more constant clamping pressure. Keepers distribute clamping force more effectively.
Unique location of pulling eye provides clearance for stringing tackle.
U-bolts and keepers can be raised as single unit to clean cable groove without complete removal of nuts.
Doubled wave seat and positioned U-bolts provide excellent holding power through efficient snubbing action.

ALCOA ADDS NEW DEAD END CLAMP TO ALUMINUM CONDUCTOR ACCESSORY LINE

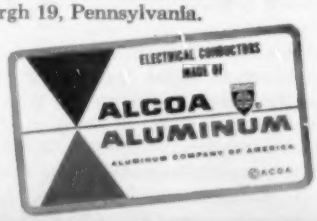
This new aluminum dead end clamp is Alcoa's latest addition to its well-known line of conductor accessories. The new series of straight distribution-type clamps covers a full range of cable sizes from 0.375″ to 1.45″ diameter. Designed by Alcoa engineers, based on field experience and needs, tested by Alcoa's laboratories, produced under rigid quality controls in Alcoa's conductor plants, its extra-quality features are typical of the complete line of Alcoa® Aluminum Accessories.

Each accessory in the Alcoa line has distinct competitive advantages. You get additional advantages by making Alcoa your source for all your conductor and accessory requirements:

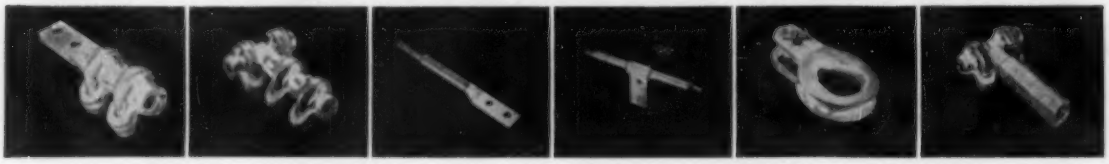
1. A COMPLETE LINE of aluminum conductors and accessories made for each other. Designed, engineered and produced by the world's most experienced manufacturer of electrical conductors—Alcoa.
2. A SINGLE SOURCE for all your aluminum conductor and accessory needs. Undivided responsibility, less paper work, fewer problems of co-ordinating deliveries.
3. TECHNICAL SERVICE of the outstanding research laboratories and the most experienced crew of headquarters and field service advisers in the aluminum conductor business.

Aluminum Company of America, 2313-V Alcoa Building, Pittsburgh 19, Pennsylvania.

Your Guide to Aluminum Value



Always use Alcoa Aluminum Accessories with Aluminum Conductors



Water Heaters Get Wattage Surgery

SALES
Residential

Washington Water Power Co., guided by market survey, builds load by replacing small elements at a flat-rate conversion charge

Conversion of low-wattage water heaters to provide service comparable to that of quick-recovery units is the goal of a load-building campaign of Washington Water Power Co. Initial success of the program may be attributed to these factors:

1. Use of only three types of replacement elements.
2. A $17.50 flat-rate charge for practically all conversions to 4,000-w tank ratings.
3. Pre-campaign survey of the replacement market.

The company has estimated that 25% or more of its customers have tank heaters of 30 or 40-gal capacity. Principal target in the campaign are those customers dissatisfied with their small heaters but not in the market for a new quick-recovery unit.

Find Dissatisfied Customers

The utility's first step was to find out how many customers had small tanks and how many of them were dissatisfied. Manufacturers of the popular heaters used in the territory were asked for sales figures of 30 and 40-gal tanks over the past few years. These sizes were the potential trouble makers. An investigation was made of the number of water heater complaints received through the company's service department and representative dealers. Company salesmen were asked to establish the number of times water heater dissatisfaction came up on sales calls. Finally, an attempt was made to find the approach gas competition would take to this market. Natural gas will soon be available.

Answers were not always to the liking of the utility. Evidence pointed strongly toward 25% or more of its customers using either a 30 or 40-gal water heater. Complaint calls, which included burn outs, averaged 150 to 200 per month. A survey-type question asked at home service demonstrations showed that over 50% of those answering remembered running out of hot water.

Survey Kicked Off Program

Prior to the start of the conversion program, a survey was made in which customers were called and their equipment surveyed and cataloged. These data provided a great amount of helpful information. But before second calls could be made on small tank owners to determine the adequacy of their water heaters, it was felt that a simple, economical solution should be offered to effect conversion.

Obviously, customers in a position to buy a replacement tank could be sold a quick-recovery heater. But customers who would not spend that much money were the ones to work on. With some variations, water heaters used by these customers fell into three types—wrap around, immersion, and well. To convert these to higher wattages at a small expense was the goal. A maximum of $20 was set as the most anyone would spend on a tank. It was decided to convert existing tanks to a maximum of 4,000 w and remove any load limiting devices still in operation at a flat rate, depending on the type of tank.

Prior to the recent change in recommendations by Water Power, 40-gal tank specifications allowed 1,500 w for the upper element and 1,000 w for the bottom. Thus it would be most economical to double the wattage of the upper element wherever possible. Immersion heaters represent the greatest number of brands but not necessarily the greatest number of tanks on the system. These are comparatively easy to convert using replacement elements. Flat rate for partially draining the tank and changing from a 1,500-w to a 3,000-w element was set at $15.00.

Wrap-Around Heaters Used

Wrap-around heaters are of two general kinds: Those that could be serviced without removing the jacket, and those that required removal. Most of the first group could be changed simply and inexpensively. The flat rate was $10. The second group would cost $17.50 because of the additional labor. However, some of these tanks proved so difficult that conversion was impractical.

For well-type heaters, both existing elements were removed and replaced with two 2,000-w elements. The additional expense for materials in this method is offset by a lesser labor charge. Conversion price was set at $17.50. Terms were to be 90 days with no carrying charge.

Each type of conversion first was tested on employee installations. In every case, satisfactory water heating performance resulted. The program then was presented to the utility's salesmen. Contractors were notified and were asked to follow the same procedure in replacing maximum wattage elements on burn-out or trouble calls. They were told the program was experimental and that there would be no general advertising. If the campaign proved highly successful, it would be turned over to them.

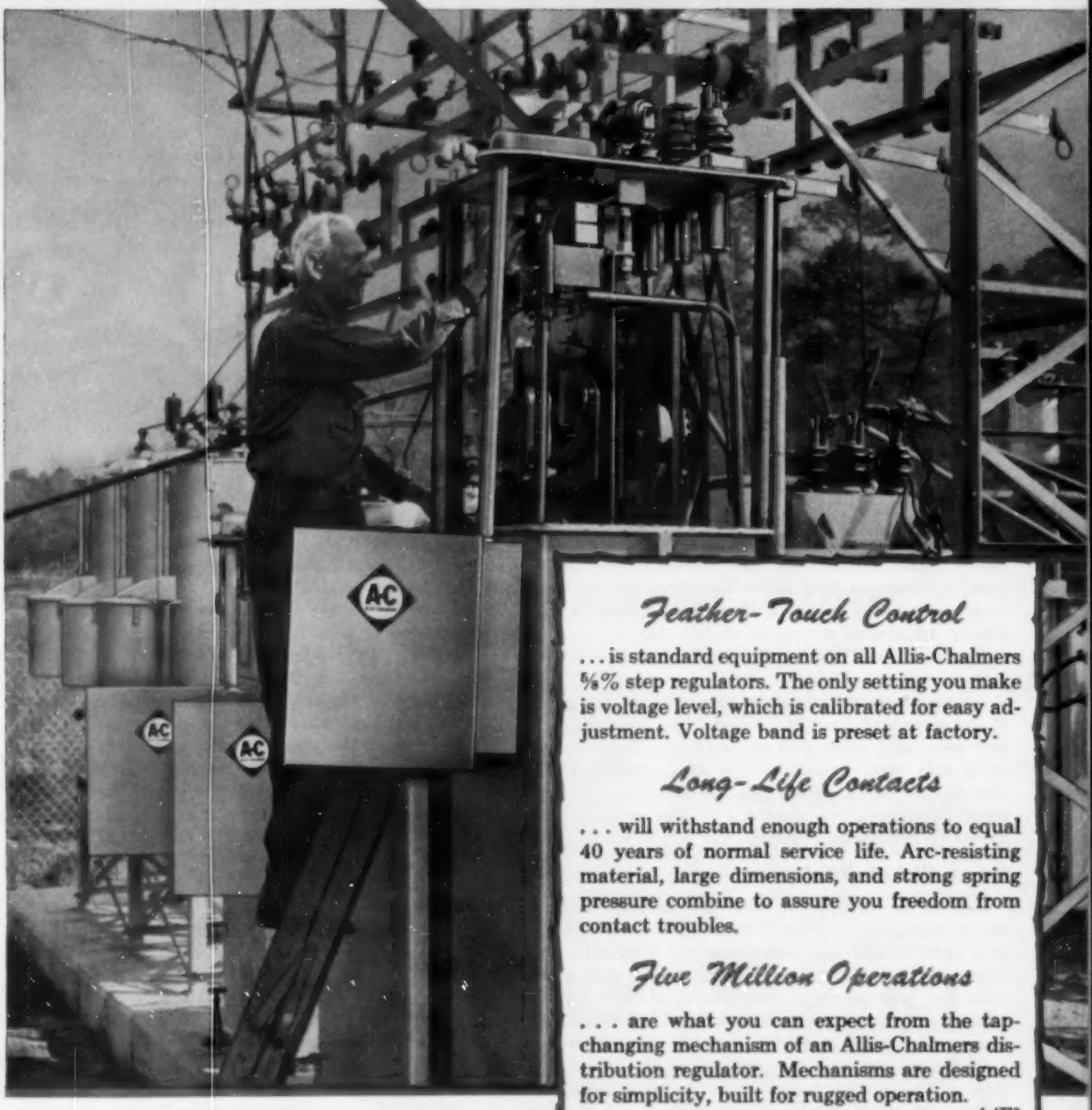
Salesmen Ad Lib

In contacting a customer, the salesman does not use a prepared approach. Whenever a 30 or 40-gal water heater is found, the salesman asks, "Do you ever run out of hot water?" It has not proved difficult to obtain customer reaction to this condition. About 50% of the conversions have been made on the first call, about 35% on the second call, and the remainder on third or subsequent calls. These calls include those by phone with man of the family.

Literature, soon to be available, was not prepared at the outset because of the experimental nature of the project. It is hoped that a written explanation for the man of the house will reduce the call-backs materially. Word-of-mouth advertising has proved helpful and productive. On the other hand, a newspaper ad in two papers with the largest circulation produced a response less than was anticipated. Nevertheless, the company is planning a series of TV ads

(*Continued on page 55*)

How Cover Regulator



Feather-Touch Control

. . . is standard equipment on all Allis-Chalmers ⅝% step regulators. The only setting you make is voltage level, which is calibrated for easy adjustment. Voltage band is preset at factory.

Long-Life Contacts

. . . will withstand enough operations to equal 40 years of normal service life. Arc-resisting material, large dimensions, and strong spring pressure combine to assure you freedom from contact troubles.

Five Million Operations

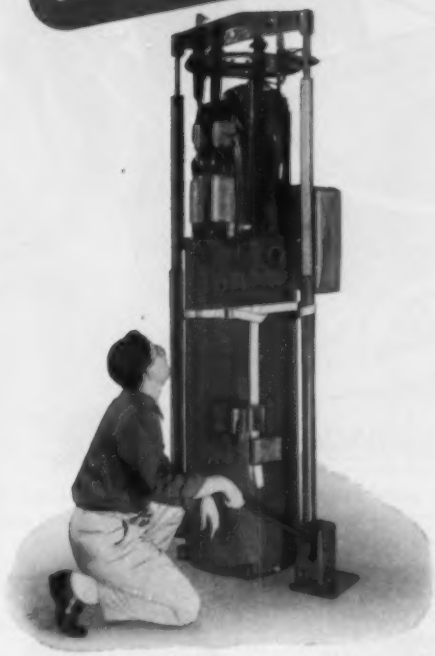
. . . are what you can expect from the tap-changing mechanism of an Allis-Chalmers distribution regulator. Mechanisms are designed for simplicity, built for rugged operation.

A-4770

ALLIS-

Suspension Saves Inspection Time

ALLIS-CHALMERS
5/8% STEP VOLTAGE REGULATORS



Untanking a regulator is easy when its components are cover suspended. Use a truck crane, block and tackle, or this more convenient inspection jack. Designed for use with Allis-Chalmers regulators, it can be used to untank either distribution or single-phase power regulators. Jacks are available—see your nearby Allis-Chalmers office.

ROUTINE inspections are *really* routine when you have Allis-Chalmers single-phase voltage regulators on your system. It takes less time and less manpower to inspect an Allis-Chalmers single-phase regulator than any other regulator on the market.

Here's why! A-C regulators have all their components suspended from the cover when untanking. Just remove a few cover bolts and control cabinet mounting bolts. Then hoist up on the cover and the complete unit — tap changer, transformer and control — comes up into view. There are no leads to break; no oil to mess with.

You can operate the complete unit outside the tank. Just connect an external power source to energize the control. There are no special connections to make.

Conveniences like these come as the natural result of Allis-Chalmers experience in the design and manufacture of step regulators. No other manufacturer can match it. And no other manufacturer offers ⅝% step regulators that have given more than 20 solid years of utility satisfaction.

Get complete information. Call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

CHALMERS

A-C ALLIS-CHALMERS

a slow speed meter will live longer too!

Whatever you're doing, wherever you are, you'll live longer if you slow down.

Slow speed equipment will live longer too . . . because there's less wear, less friction. Thats why the slow speed Sangamo J2 Watthour Meter lasts longer than other meters . . . *because the disk speed of the J2 is a full 40% slower* than the disk speed of any other watthour meter on the market.

The J2 meter with its 6. constant needs less compensation for accuracy from the lightest loads to its full capacity of 100 amperes. And the remarkably good and *uniform* load characteristics of this slow speed design have been proved on utility companies' lines throughout the country.

***DO YOUR PART—"SLOW DOWN AND LIVE"** The nation-wide "Slow Down and Live" traffic safety campaign, sponsored by the National Conference of State Safety Coordinators, is underway and will continue through Labor Day. Started in 1953 by a group of northeastern states, this campaign was so successful, it was extended to 24 states last year. The result: 601 lives saved. The National Safety Council estimates the 1955 campaign among all states will save 1100 lives if as successful as the 24-state campaign last year. So do your part—"Slow Down and Live."

JM55-6

THE J2 METER IS THE SLOW SPEED METER

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Wattage Surgery

(*Continued from page* 51)

and will run ads in the newspapers again.

There were 40 conversions during the first month of the campaign. A preliminary survey indicated complete satisfaction on every job. There have been some delays in receiving elements, in spite of previous assurances they were available. From some unusual installations it has been learned that the salesman on his original contact cannot guarantee the job can be done for the flat rate. In some cases it could not be done at all. The salesman now takes the order and quotes the price for normal conditions. The serviceman makes the conversation if normal. If it is unusual, he explains the difficulty to the customer. If it can be converted, he gives the new cost of doing the job. There is no charge unless an actual conversation is made.

During the second month of the campaign, a meeting was held with distributors. It was the consensus that the program, because of its problems, should remain as a utility function. In some isolated areas dealers have expressed a desire to perform the work. They will receive their share of orders. Because of delays in receiving elements and difficulties encountered with the conversion of wrap-around tanks, a low pressure selling campaign is being used.

The decision has been made to standardize on the flat rate of $17.50 for all conversions. Nearly 80% of the conversions have been on the well type water heater. The next largest group of potential customers was in the wrap-around type. Both were priced at $17.50. Cost analysis of these jobs shows that Water Power is breaking even and is equipped to continue without a loss.

Pacific Car & Foundry Co photo

OLD TOP-MOUNTED INCANDESCENT LIGHTS stood side by side with mercury-vapors and remained operating until the new system was completely installed

No Street Light Blackout During Change

SALES
Commercial

Old street lights in Sumner, Wash., burned as usual while switch was made to mercury vapors

By letting the existing system remain operating until the new poles and lamps were ready, Sumner, Wash. converted its street lighting from incandescent to mercury-vapor without a break in service. The change required 64 installations on four streets at a cost of $10,000.

New 28-ft steel light poles and mercury-vapor lamps replaced top-mounted incandescent lights on 16-ft standards. Bracket arms on the new poles are 6-ft long with one 12-ft bracket at intersections. The steel poles are integral transformer-base types with special adaptation for overhead wiring. The OV-20 mercury-vapor luminaires mount 21,000 lumen 400-w, EH-1 mercury vapor lamps. With poles set in alternating positions every 150 ft, average surface illumination is 1.5 to 2 ft-c.

Side street lights are installed on 6-ft and 10-ft bracket arms adapted from existing wooden utility poles. Puget Sound Power & Light Co installed the luminaires and brackets for the wooden poles. City crews installed the steel poles and removed the old ones.

S & S SHORTS

Window Unit Saves Fireman

The value of having air conditioning available in hospitals was underscored on the July 4 week end when a critically burned Chicago fireman took a turn for the worse. Doctors recommended that a window air conditioner be put in Dini Gino's room to reduce the humidity that was sapping his strength. But all shops were closed for the holiday. Finally a unit was procured and installed. Gino immediately began to improve, and ultimately recovered. The unit is credited with saving his life.

Inside Job

A table equipped with telescopic legs which permits casement window-type room air conditioners to be installed completely inside a room is being offered with models made by Westinghouse Electric Corp.

Resumes Air Conditioner Output

Westinghouse Electric Corp has resumed its own production of room air conditioners at its Springfield, Mass. plant after a 13-year hiatus. The company pulled out of business in 1942 under pressure of wartime production. Last year it marketed a line manufactured by an outside supplier.

PP&L Busts Range Quota

Pennsylvania Power & Light Co gave away 2,164 white nylon gloves to new electric range buyers during its five-week range campaign this year. This is 108.2% of the quota set by PP&L, and represents a 20% increase in range sales over the same period of 1954.

MANUFACTURERS AND MARKETS

GE Dedicates New Research Laboratory

A $5-million research building, described as the world's most complete metals and ceramics processing laboratory, was dedicated at Schenectady, N. Y., recently by General Electric Co. The laboratory is designed to bridge the gap between basic test tube research and the full scale production line.

The "factory size" building with more than 75,000 sq ft of floor space contains facilities of both laboratory and industrial size. The latter will be used to operate pilot plants and obtain economic data on new processes or new materials developed by basic research.

Among the projects underway in the new building are the perfection of iron-base alloys that will cut down power losses in magnetic circuits and the development of economical melting and fabrication techniques for such metals as titanium and zirconium (the latter is used in the pile structure and heat transfer members of atomic reactors).

To suit the varying complexity of problems expected to be handled by the new facilities, the building has an internal structure like an "Erector set" to permit quick assembly and easy alteration as a process is developed and perfected. Power supplies and service facilities have been arranged on a "modular" basis for maximum flexibility.

Colombia Studies Utility Expansion Program

A long range national electrification program calling for an expenditure of about $1.2 billion is being studied by the government of Colombia, S. A. The plan calls for increasing the nation's generating capacity from its present 338,000 kw to 2,695,000 kw by 1970.

The program is the result of a joint study started in 1953 by Gibbs & Hill, Inc, New York consulting engineers, and Electricite de France, the French national power utility. Both organizations, made their study in conjunction with the Colombian National Institute of Water and Electric Power Development.

Successive steps in the program call for an increase in generating capacity to 1,150,000 kw by 1960, to 1,792,000 kw by 1965 and the ultimate figure by 1970. It is estimated that one-half of the total cost of the program will be spent for the purchase of equipment outside of Colombia.

Mfr Changes Name

Knopp Inc. is the new name for Electrical Facilities Inc. of Oakland, Calif. By this change the product name and the manufacturer's identity will be similar. The firm will continue to make precision transformers, testing equipment and rectifiers known by the brand name of Knopp.

A-C Awarded Contract for Four Noxon Turbines

A contract for four 137,500-hp, 152-ft head hydraulic turbines has been awarded Allis-Chalmers Manufacturing Co by the Washington Water Power Co through its agent, Ebasco Services, Inc. The units are for WWP's Noxon Rapids hydroelectric development on Clark Fork in northwest Montana.

The turbines will be of single vertical Francis runner, welded plate steel scroll case type with twin cabinet type oil pressure governors. In physical size, they reportedly will rank with the largest in the world.

First turbine is scheduled to be shipped the latter part of 1958, with the others following at about three-month intervals. Runners for the Noxon turbines are of such size that they will have to be designed in several sections to permit shipment.

Elliott Moves C-W Div, Worthington Buys Plant

The Elliott Co recently moved its Crocker-Wheeler Division to Jeannette, Pa., and sold to the Worthington Corp the 15-acre factory site in the Ampere section of East Orange, N. J.

Worthington's acquisition will accommodate two product divisions — the manufacture of large central station air conditioning equipment, and the manufacture of standard pumps.

Headquarters of the first mentioned division will be moved soon to the Ampere site, and eventually all of the pump division will be moved to the same location.

Westinghouse Develops New Wire Insulation

Scientists at Westinghouse Research Laboratories have developed a new insulating enamel for copper wire. Tests on motors insulated with the enamel show that they can operate continuously for ten years at a temperature of 325F without damage to the insulation.

Use of this insulation in place of

(*Continued on page* 59)

"They're safe to perch on . . . and Pole Star®

offers a choice of neoprene or porcelain protective caps for high voltage cover-mounted bushings."

Like the wise old bird says, his furred and feathered friends can romp around Pole Star cap-protected, high voltage, cover-mounted bushings without worrying about coming in contact with live parts. Many users of Pole Star transformers specify this feature — to protect wildlife, as well as to eliminate the service interruptions and damage that birds and animals sometimes cause. The most common use of caps is on Protected Pole Stars, Pennsylvania's CSP transformers.

To satisfy the preference of all customers requesting this protection, Pole Star now offers a *choice* of two different protective caps — either **neoprene or porcelain.** Caps can be furnished for the high voltage cover-mounted bushings of any Pole Star transformer. The caps are easily installed by simply sliding them over the top of the high voltage cover bushing.

Offering a *choice* of material in an *optional* feature typifies Pennsylvania's concern with every detail of transformer application. The "optional option" of protective caps is available, at a nominal addition in cost, with either conventional or Protected Pole Stars.

Protected Pole Star transformers are available in all single phase sizes from 3 through 100 Kva, 480 through 14,400 volts. Conventional Pole Stars, from 3 through 500 Kva, 480 through 67,000 volts.

POLE STAR

pt

Distribution Sales Department

PENNSYLVANIA TRANSFORMER COMPANY

A McGraw Electric Company Division

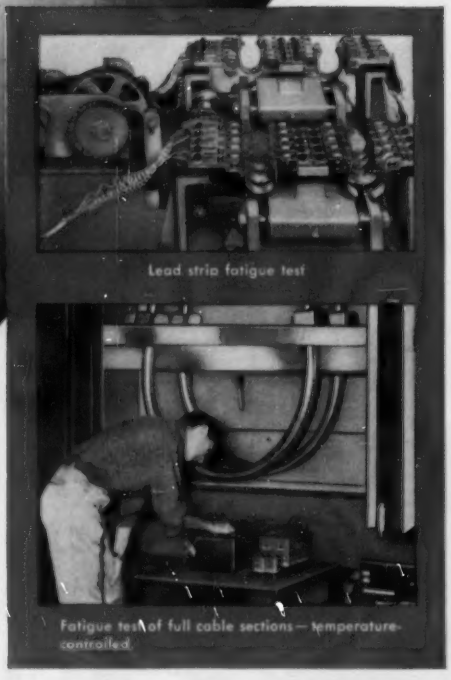
CANONSBURG • PENNSYLVANIA

ROEBLING PAPER POWER CABLE WITH TELLURIUM LEAD ALLOY SHEATH

TELLURIUM LEAD ALLOY SHEATHS MEET ALL REQUIREMENTS FOR FATIGUE RESISTANCE

TODAY'S HIGHER TEMPERATURES and increased loads are power cable problems met most satisfactorily and economically by Roebling Tellurium Lead Alloy Sheath. This sheath has absolutely top fatigue resistance; gives vastly increased service life despite severe bending stresses and cable movement during load cycles. Furthermore, Roebling Tellurium Lead Alloy has outstanding stability under heat—high temperature incurred at joints, terminations and in duct splicing cause no grain growth or physical impairment.

Roebling is unmatched in the breadth of its experience with Tellurium Lead Alloy Sheath and in the volume of cable it has produced with this remarkable sheathing. We will welcome the opportunity to send you Bulletin 205-B containing technical data on Roebling Tellurium Alloy Sheaths.



Lead strip fatigue test

Fatigue test of full cable sections—temperature-controlled

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 11-15 STILLING ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13228 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1722 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

Wire Insulation

(*Continued from page* 56)

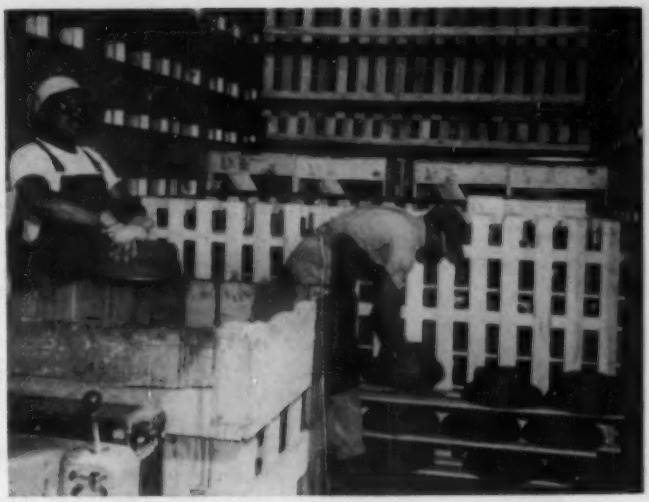
the glass insulation normally required for high-temperature motor windings would reduce the insulation thickness by 50%, say Westinghouse scientists.

The new enamel, called 1267, is a modified polyester-type resin containing about 20% silicone. It has been used for more than a year in pilot scale manufacture of Westinghouse motors in addition to being used in transformers and in coils of high-temperature relays.

Taylor-Colquitt Adds Penta-Treating Tank

Taylor-Colquitt Co, Spartanburg, S. C., has converted recently one of its nine pressure-treating cylinders from creosote to pentachlorophenol use. This is in line with the growing demand for penta-treated poles, crossarms and other wood construction materials. The new cylinder is 8 ft in diameter and 125 ft in length. Its capacity will be 40,000 board ft per charge.

"These added facilities will enable us to offer a broader range of services to our customers," M. P. Brown, vice president, said in announcing the conversion. "The first load of penta-treated material will be utility poles," Brown said.



Box Car Loader Cuts Shipping Costs

U. S. Electrical Motors, Inc, has been experimenting with specially equipped box cars in an attempt to reduce shipping costs by cutting freight charges and damage to merchandise in transit. To date, the experiment has paid dividends in shipments of motors (fractional to 400 hp) and parts between the company's plants in Los Angeles, Calif., and Milford, Conn.

The box cars being used are equipped with DF-Loaders (damage free, dunnage free), made by Evans Products Co, Plymouth, Mich. Basically, the loader consists of wall belt rails welded to the sides of the cars, bulkheads, deckboards, and cross members which lock into the belt rails to hold loads in place.

According to the company's traffic department, the loaders have provided savings in labor, freight costs and damage to equipment. Using conventional cars, damage in transit ordinarily ran about 1% of shipment (about 20 ton per car). It has now almost disappeared and no damage claim has been filed in over a year.

To further reduce damage, the company is experimenting with portable bins for shipping smaller parts.

MANUFACTURING BRIEFS

Philco Corp has moved its West Coast and Pacific Northwest Regional Sales office of the Government & Industrial Sales Division to a new location—1355 Market St, San Francisco 3, Calif. Lewis J. Boss is Regional Sales Engineer and will have as an associate Griffin L. Ashby formerly in the Division's Denver office.

Modern Age Electrical Industries Co was organized recently to manufacture electric housewares and appliances with a new type of heating element. First product will be a table fry-pan. Company address is 10,231 Puritan Ave, Detroit 38, Mich. Henry Morton, formerly with Detroit Edison Co, is president. William Mathers is sales vice president. Eugene Berry is secretary-treasurer.

Westinghouse Electric Corp will soon ship a 105,000-kw steam turbine from its Sunnyvale, Calif., plant, the largest built in the West. This turbine and its companion generator from East Pittsburgh will be installed at the Mountain Creek generating station of Dallas Power & Light Co.

Barber-Coleman Co's Wheelco Instruments Division will move its Chicago office into new and expanded facilities at 6610 N. Sheridan Rd, Chicago 26, Ill. The new office includes an instrument repair shop and a stock of replacement parts.

General Electric Co announces that its Low Voltage Switchgear Dept., in Philadelphia, has assumed responsibility for the marketing of the company's line of current-limiting fuses rated 250 and 600 v, in sizes ranging from 6 to 200 amp. The Construction Materials Dept., Providence, R. I., formerly handled this function.

Murray Corp of America, Detroit, will purchase Easy Washing Machine Corp, Syracuse, N. Y., subject to approval by Easy's stockholders.

Sperry Rand Corp, incorporated in the State of Delaware, is a consolidation of Remington Rand Inc and Sperry Corp. Headquarters will be at 30 Rockefeller Plaza, New York City. Harry F. Vickers is president and chief executive; John Sanderson is vice president and secretary; and Bernard O. Reuther is vice president and treasurer.

BUSINESS OUTLOOK

Electrical World
AUGUST 29, 1955

The outlook, in brief: The economy is still setting records. Output of all goods and services is higher than it has ever been. Now the Administration is worried about inflation—has taken a number of steps to curb it before it gets rolling. Meanwhile, profits are very high and business is again spending more to build new plants and equipment.

Gross National Product (output of all goods and services) averaged $385 billion for the second quarter, at an annual rate. That's higher than ever before—almost $10 billion above the revised first quarter rate. It's now 7% higher than in the second quarter of 1954—the low point in business last year.

What accounts for this upward surge of the economy? It's mostly due to the high level of consumer incomes and spending. But another factor has been the shift from a period of inventory liquidation to a rapid building of stocks.

When prices are rising—and industrial prices are now moving up—people buy more than they need to beat the price rise. This might put even more pressure on prices and end in a speculative boom. In recent weeks the Administration has become increasingly worried.

Result: a tighter credit policy all along the line

▶To curb inventory building, the Federal Reserve Board has forced interest rates up by raising the discount rate to member banks.

▶To curb speculative homebuilding, FHA and VA have tightened up on mortgages—a 25 instead of 30 year repayment period and slightly higher down payment charges for guaranteed loans.

▶To hold instalment buying of new cars and appliances in bounds, FRB is requiring member banks to report on instalment loans they extend.

All this adds up to a definite line to halt inflation before it gets off the ground. But some observers are still asking: Is it enough? If not, you can bet the government will take firmer steps soon.

Profits have never looked as good as they do right now. Corporate profits before tax in the first half were $42 billion at an annual rate—up $8½ billion from the average during the recession months of 1954. Second half profits will feel the squeeze of higher labor and materials costs. But for the year as a whole, profits should still top the previous 1951 high.

Higher profits have meant larger expansion and modernization programs. So, capital spending by business is turning up. The outlay for new plants and equipment in the third quarter is as high as in the peak third quarter of 1953. Sharing in the rise are electric power companies and gas utilities. There's a big increase in gas pipe-line construction.

Generally, the boost in capital spending is to meet new consumer demand. It's not spurred, as formerly, by defense considerations. In fact, the Office of Defense Mobilization is applying a brake to its fast tax-write off program for defense related industries. This curb is also aimed, in part, at putting a damper on inflation.

THIS IS A HIGH CURRENT TRANSFORMER BUSHING

This assembly does not appear to be very complicated. As a matter of fact, it isn't. Its design represents no masterpiece of engineering ingenuity. No serious troubles are involved in its manufacture. It's a routine "special job"—*for Lapp.*

The point is just that—that such jobs are routine at Lapp. This piece is the result of the inquiry from a transformer manufacturer, "What can you make us in the way of 3200-ampere 2500-volt bushings?"

The assembly, as you see, is trim, neat and functional. Designed to solve a vexing problem, it does its job dependably.

We call your attention to it only because it illustrates the ability and willingness of Lapp to design and produce insulating assemblies to meet specific and unusual conditions. And these are skills and facilities which have been called on so many times over the past 38 years, for solution of so many kinds of problems, that we think we now know how to approach almost any requirement involving high-current and/or high-voltage insulation. Not only in bushings—which we've produced successfully in just about every design known—but also transmission line and station insulators—and other types of special porcelain for America's best manufacturers of equipment.

Lapp Insulator Co., Inc., Le Roy, N. Y.

Lapp

IN THE INDUSTRY

Lighter Side of Lighting Business

It's not just the summer doldrums; things like this happen all the time. Drunken poles and sober bob cats add spice and smiles to the daily routine

The electric utility business is a dead serious one, but somehow humor will out. Here is a sample of stories and items calculated to wring a smile from people who can also appreciate the woes involved:

Drunken power poles—Chattanooga Power Board keeps a map to chart pole damage due to erring motorists. Bill Morris of the Board's overhead line office stuck another red thumbtack in the map and casually observed, "Well, I see where another of our drunken poles hit a car last night."

Miami undressed—A Miami meter reader opines that the citizens of that resort and industrial city must be among the cleanest in the world. His observation is based on the number of householders draped in bath towels who answer their doors.

Bob cat bonus—Pacific Power & Light Co linesmen have their share of trouble with animals who flout safety regulations on high voltage lines. But they don't mind clearing an occasional bob cat from a 12-kv grid. Bounty on bob cats in that neck of the woods is $2.50.

Lion in kitchen—A Colorado meter reader going about his duties came upon a real live mountain lion parked under the kitchen sink in a customer's house. The reader reversed his course, hastily decided to read the meter later. But the housewife called out to assure him, "Don't worry, we've got the lion chained to the drain pipe."

Power over poker—The swank airport poker parlor in Los Angeles must come down to make room for the City's big new electric power plant. But the Department of Water and Power is not getting the full blame for being a killjoy. Police have kept a padlock on club doors for the past 30 months.

Bird carries paycheck—A power plant worker in Capetown, South Africa, is taking no chances of stick-up men lifting his paycheck. Every Friday he fastens his check to the leg of a homing pigeon, lets the pigeon bring home the bacon.

Electric-gas stove next?—The Ricksha Club in Houston boasts an electrical charcoal broiler. Houston Lighting & Power Co helped sell the job.

Monkey hunt—Town of Plainfield, N. J., called on an electric company line crew to help capture a monkey which had taken to the trees. After giving linemen a hasty lesson in plain and fancy climbing, the creature took to the woods.

Copper rustling—In Mexico trial is underway for eight men charged with swiping ten miles of line right off transmission towers. And in Alamogordo, N. M., sheriffs searching for 6,000 lb of copper stolen from Community Public Service Co's storage yard turned up another large quantity of copper that had been taken from the government's White Sands rocket proving station.

TECHNICAL NOTES

Reactor cores in parallel, each able to operate independently, offer higher availability for utility power production.

Voltage injection quenches transitory phase-to-ground faults by momentarily introducing into the neutral resistor circuit a transformer feeding back into the faulted phase. Fault current and injected current are equal and out of phase, hence the arc is suppressed.

Aspen is most effectively controlled by applying 2, 4, 5-T (16-40 lb per 100 gal) during the June-to-August growing season. Winter basal spraying had to be repeated three consecutive years.

Duplicate single-phase triplex secondaries and separate service drops enable one utility to serve 5-hp central air conditioners and major home appliances without imposing motor-starting flicker on lighting and television. House meters are standard 2-element designs without electrical connection between elements.

Pressures in sealed transformers are less than values calculated from volume and temperature because pressure rise causes gas to dissolve rapidly in the insulating oil. Subsequent release of the gas, when conditions causing it to dissolve are removed, is very slow.

Hydroelectric plants will remain advantageous for peak-load operation despite possible ultimate replacement of fossil fuels by nuclear fuel.

Microwave for system relaying can be made reliable by proper design and maintenance. Where one system can provide 99% service, a standby duplicate safeguards 99% of the first system's down time for 99.99% overall.

Turbine and twin condensers in side-exhaust arrangement take up a third more width but require a third less height.

Transmission cost per kw of 380-kv system with series capacitors is 40% below 220-kv experience.

New Views on Rate Base Aired

William H. Howe, staff engineer of the Arizona Corporation Commission, speaking before the Mountain-Pacific States Conference of Public Service Commissions in June 1955, raised some interesting, and perhaps controversial, points in the field of utility regulation.

After outlining briefly the legal authority of various state commissions, Howe noted: "Throughout the many years of regulation, and more particularly within recent years, we have become accustomed to thinking that the rate of return which a utility should be allowed is about 6% on its rate base . . . but when we think of a national or industry-wide average return of 6%, we should bear in mind that this rate of return is **predicated upon a rate base of average net investment and not some theoretical, speculative or hypothetical figure to represent present day inflated costs of replacement** (emphasis supplied). So we find that what may be a return of 6% on a rate base in one state may be the equivalent, dollar-wise, of a much higher rate of return on average net investment."

Fair Value: A Guide

In commenting on the situation in Arizona, Howe pointed out: "The constitutional provision, (which created the commission) also, requires the commission to ascertain the fair value of every utility within the state to aid and assist it in the proper discharge of its duties. **No mention is made in the Arizona Constitution of what is fair value nor is there any reference or directive made that once having determined fair value that such value shall be a rate base. The language is clear that it is merely to aid and assist the commission in the discharge of its duties** (emphasis supplied). There is no reference or implication within the Arizona Constitution of what shall be a fair rate of return although a superior court decision in 1949 stated that a rate of return less than 5% was confiscatory."

Pointing out that some utilities in rate case proceedings have claimed that "fair value" and reproduction cost new less observed depreciation are one and the same thing, Howe noted: "In the light of the clear and concise language of the Arizona Constitution that 'rates and charges shall be just and reasonable' it would appear that the end-result of just and reasonable rates is the basic consideration or governing factor. Incidentally, this same line of thought and reasoning seems to be amply supported by the Hope Natural Gas Co decision of the U. S. Supreme Court in 1944." (Editor's Note: The Hope decision was a federal case dealing with the problem of confiscation under the Natural Gas Act.)

Howe pointed out that at the present moment a case was pending in the Supreme Court of Arizona which sought an interpretation of what constituted fair value for rate-making purposes.

Rate Making: Fair 'End Result'

The speaker, in discussing the end result approach to rate making, said: "Earlier in this discussion, I pointed out that the return on rate base to a utility, in actual dollars, is the product or multiplication of rate base (however determined) by the allowable rate of return (however determined). Herein, we are dealing with two factors, one or both of which may be variables as far as the respective states are concerned, to determine a fair and specific end-result. In such a situation, as just mentioned, it becomes increasingly apparent that one or both of the factors which were fair and equitable in one instance may be grossly unfair and inequitable in another case. In dealing with such situations as I have just mentioned, I think I am safe in saying that most regulatory commissions are vested with authority embracing a reasonable degree of latitude in determining what is a fair rate base and what is a fair rate of return to be related thereto."

In arriving at a fair "end result", Howe said: "In some of the more recent rate cases before the Arizona Commission, particularly telephone and electric utilities, **the staff has been using a method of testing the fairness of overall return to the company on the basis of the industry wide average return to the common equity with respect to debt leverage. The Arizona staff uses other tests of a fair return in its presentation of rate cases and there is no implication herein that equity earnings is the only test of reasonableness** (emphasis supplied).

"When we stop to consider that the capitalization of a company," Howe said, "is composed of long term debt in the form of bonds and debentures, preferred stock and common equity, it is evident the interest on debt and the dividends for preferred stock are fixed or contractual obligations, leaving only the common equity for the determination of a just and fair return. In other words, the common equity is the variable of these component items of capitalization since the requirements for debt and preferred stock are readily known."

In discussing the Class A and B electric utilities as a group, particularly with respect to their debt characteristics, Howe said: "If we break down the entire group of these companies into several smaller component groups or steps with respect to their debt ratios, we find there is a close correlation giving a very smooth and consistent curve when we plot the rate of return to the common equity against the debt leverage or debt ratio. Of the 300 companies, there are about 40 companies having no debt and we find this group has averaged about 5½% return on common equity."

Debt Ratios Discussed

"On the other hand," Howe said, "there are about 11 companies at the other extreme with an average debt ratio in excess of 85% of total capitalization which have averaged more than 15% return to the common equity. Between these two extremes, however, are about 250 other companies with varying debt ratios and varying rates of return to the common equity, all of which, when considered on a weighted average long term basis, show a very close correlation or relationship of the rate of return on common equity with respect to debt leverage."

"In other words," the Arizona engineer said, "here is the industry and what it has done in recent years, representing the composite and compounded average judgment of some

40 state regulatory agencies in their determinations of what is a fair return. Consciously or otherwise, the overall industry experience throughout the land has been such that there is a consistent pattern of return to the common equity with respect to debt leverage."

In conclusion, Howe said: "Whether or not the construction of a rate base is lawfully necessary in the determination of the reasonableness of the return flowing therefrom will vary from state to state depending upon the constitutional or statutory requirements of the particular state. I think we can agree it is a legal problem and in view of the varying legal requirements in each state, it is something which must be reconciled to each state's particular legal requirements. **However, in the light of the discretionary range of judgment which a regulatory commission may exercise within reasonable limits, both with respect to the determination of the rate base and its associated rate of return, it would appear there are other and more equitable elements to be considered"** (emphasis supplied).

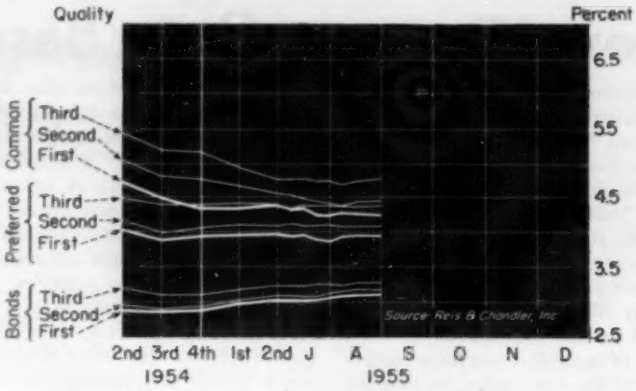
Interlocking Directors Not Allowed by FPC

The Federal Power Commission has ruled against three requests to hold interlocking directorships in a utilities securities underwriting firm and utility companies. FPC said it had not been shown that neither the public nor private interests would be affected.

Denied were requests by: William J. Froelich, Chicago, Ill., to hold office of director in both Wisconsin Public Service Corp and H. M. Byllesby & Co, an investment banking and underwriting firm; John P. Wagner, Chicago, Ill., to hold directorships in Wisconsin Public Service, and Edward O. Boshell, Wilmerding, Pa., to hold a directorship in Byllesby & Co. Boshell is now a director and chairman of the executive and finance committee of Duquesne Light Co.

In its denial, FPC pointed out that Wisconsin and Duquesne had been subsidiaries in Standard Power & Light Corp, which has been dissolved by the Securities and Exchange Commission. Byllesby or its predecessors had controlled the Standard system through securities ownership, interlocking officers and directors and other devices, FPC said.

Today's Utility Yields (%)



	BONDS			PREFERRED STOCKS			COMMON STOCKS		
QUALITY	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Aug. 18	3.11	3.16	3.26	3.94	4.06	4.37	4.23	4.43	4.76
Aug. 11	3.10	3.16	3.27	3.95	4.06	4.34	4.25	4.42	4.73

Utility Earnings

COMPANY	PERIOD MONTHS ENDED		NET INCOME 1955	NET INCOME 1954	EARNINGS PER COMMON SHARE 1955	EARNINGS PER COMMON SHARE 1954
Arkansas-Missouri Power	12	June	$964,127	$875,399	$1.65	$1.44
California-Pacific Utilities	12	June	663,205	616,722	2.21(a)	2.10(a)
Central Illinois Public Service	12	June	8,401,745	6,496,831	2.23(b)	1.65(b)
Columbus & Southern Ohio Electric	12	June	6,023,680	5,358,358	2.15(c)	2.04(c)
Duquesne Light	12	June	16,612,766	15,934,583	2.17(f)	2.30(f)
El Paso Electric	12	June	2,121,451	1,904,561	2.37	2.17
General Public Utilities, consolidated	12	June	24,890,288	22,683,787	2.57(b)	2.48(b)
Idaho Power	12	June	4,837,345	4,602,176	1.80	1.72
South Carolina Electric & Gas	12	June	5,026,844	4,266,594	1.37(b)	1.29(b)
Tampa Electric	12	June	3,377,486	2,649,538	1.52	1.23
West Penn Electric, consolidated	12	June	16,878,270	15,149,853	1.96	1.79

Notes—(a) Based on 241,812 shares in 1955 and 231,102 shares in 1954; (b) Based on average number of shares; (c) Based on 2,401,360 shares in 1955 and 2,201,360 shares in 1954; (f) Based on 6,600,000 shares in 1955 and 6,150,000 shares in 1954.

Utility Financing

COMPANY AND DESCRIPTION	AMOUNT OF OFFERING (000)	OFFERING PRICE	YIELD TO PUBLIC
AUGUST 18—24			
COMMON STOCK			
California Electric Power—230,000 sh	$3,364	$14.625	4.78%
SCHEDULE FOR AUGUST—SEPTEMBER			
BONDS			BID DATE
California Electric Power—1st mtg due 1985	$6,000	.....	Aug. 30
Utah Power & Light—1st mtg due 1985	15,000	.....	Sept. 13
Ohio Power—1st mtg due 1985	17,000	.....	Sept. 20
Pacific Power & Light—1st mtg due 1985	10,000	.....	Sept. 27
COMMON STOCK			
Housatonic Public Service—14,817 sh (to be offered commonholders on 1-for-25 basis, record Sept. 5 to expire Sept. 26)	.....	.....	.....
Hilo Electric Light—25,000 sh (to be offered commonholders on 1-for-5 basis, record Sept. 5; unsubscribed shs to employees at the rate of five shs for each full year of employment)	.....	.....	.....
Utah Power & Light—177,500 sh	.....	.....	Sept. 13

Two Big Bonuses—

Yours—when you purchase Locke Insulators

Two important bonus values are yours every time you order Locke Insulators.

BONUS #1

Ready to serve you is Locke's highly trained field service organization. It is the insulator industry's most competent factory-employed nation-wide technical service group. Call upon us freely . . . for help on any insulation problem . . . routine or emergency.

BONUS #2

"Thanks for your order!" is just the beginning . . . *not the end* . . . of our obligation to you and your company. At your service are the facilities of the world's best-equipped high voltage and research laboratories. Take advantage of them . . . whether your insulation problem is one of preliminary design, construction or operations.

These bonuses are included in the regular price of a Locke Insulator. They add immeasurably to its value. Obviously, you get more for your money when you specify Locke.

LOCKE

LOCKE DEPARTMENT
GENERAL ELECTRIC COMPANY
BALTIMORE, MARYLAND

STATISTICS

Construction Forecast for '55

On the UP side — predict

- 1,300,000 new private nonfarm housing starts
- commercial building up sharply—$2.9 billion (30% over 1954)
- private outlays for public utilities to rise to $4.5 billion (big gains in petroleum and gas)
- private industrial building—reversing a 3-year downtrend, up 8% to $2.2 billion
- highways—expanded Federal program will push this to $4.2 billion—12% over 1954

	1955	1954	% Change
	(million $)		
Private Construction	29,485	25,768	14
Residential	16,125	13,496	19
new dwelling units	14,600	12,070	21
additions, alterations	1,200	1,130	6
nonhousekeeping	325	296	10
Nonresidential	7,285	6,250	17
industrial	2,200	2,030	8
commercial	2,875	2,212	30
other	2,210	2,008	10
Farm	1,400	1,560	−10
Public Utilities	4,500	4,341	4
All other private	175	121	45

Showing declines — will be

- Federal spending—down more than a tenth to $3.6 billion:
  - public housing
  - conservation & development (cuts in reclamation projects and TVA steam plant construction)
  - Atomic Energy installations—(peak construction is over)
- hospitals—state, local and federal outlays all down
- farm construction—down 10%

	1955	1954	% Change
	(million $)		
Public Construction	12,315	11,809	4
Residential	250	336	−26
Nonresidential	4,490	4,641	−3
Military	1,150	1,030	12
Highways	4,200	3,750	12
Sewer & water	1,100	982	12
Miscellaneous public-service	300	218	38
Conservation & development	650	704	−8
All other public	175	148	18
TOTAL NEW CONSTRUCTION	41,800	37,577	11

Source: Depts. of Labor & Commerce

Power Statistics . . .

		Latest Month	Preceding Month	Year Ago	Annual Change %
Capacity	June	107.62	106.32	95.31	12.9
Peak—Class I Systems (million kw)	June	86.6	83.9	78.1	10.8
Estimated Dec. '55 Peak	May	96.6	96.6	95.8	0.8
Production—billion kwhr	May	43.35	42.03	37.43	15.8
hydro		9.81	10.47	10.35	− 5.1
fuel		33.54	31.56	27.08	23.8
Sales—billion kwhr	May	39.57	39.56	33.60	17.8
residential		9.71	10.54	8.88	9.4
commercial		6.18	6.14	5.68	8.8
industrial—includes sales to AEC		21.35	20.51	16.89	26.4
other		2.33	2.37	2.16	7.9
Fuel Consumption	May				
coal—million tons		10.76	10.12	8.67	24.1
oil—million barrels		4.88	5.68	4.25	14.9
gas—billion cu ft		103.43	92.82	94.70	9.3
Net Income Class A & B Co's—$ million	May	93.47	105.46	85.52	9.3

Business Statistics . . .

Indexes: 1947−49=100					
FRB Industrial Production	July	133	139	116	14.7
ENR Construction Cost	July	138.4	137.5	135.0	2.5
BLS Cost-of-Living	July	114.7	114.4	114.3	− 0.3
NEMA Sales	June				
insulation materials		158	154	124	27.4
electric appliances		122	110	102	19.6
household refrigerators		105	104	82	28.0
Wholesale prices	June				
motors and generators		120.8	120.8	123.7	− 2.3
transformers and regulators		127.3	127.3	128.1	− 0.6
switchgear and fuses		135.6	135.6	135.1	0.4
GNP—annual rate—$ billion	2nd Qtr.	$385	$375.3	$357.6	7.1

THERE'S A STOREHOUSE OF KNOWLEDGE AT MOLONEY

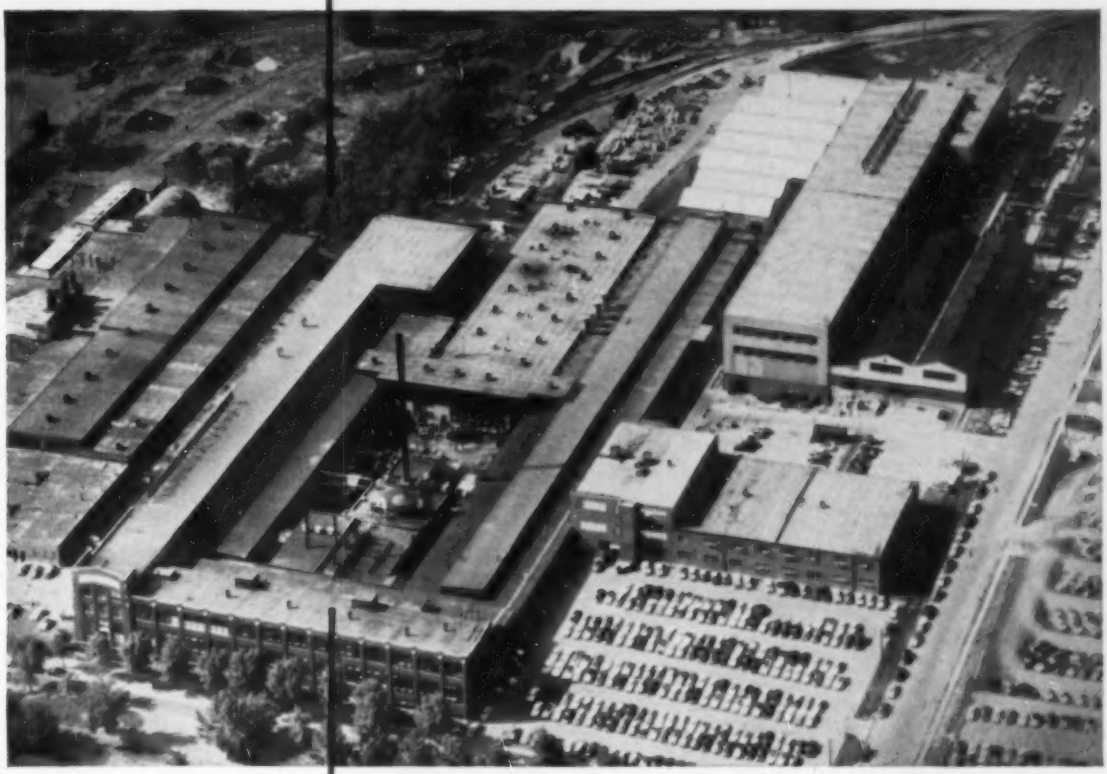
knowledge gleaned from 60 years of experience in manufacturing transformers . . .

knowledge gained from research . . .

knowledge gained from experience by Moloney's engineers . . .

knowledge that helps Moloney design and fabricate dependable transformers . . .

knowledge that means dependability in service and performance . . .



knowledge that benefits you and your utility system.

M650-55

MOLONEY ELECTRIC COMPANY

Power Transformers • Distribution Transformers • Load Tap Changing Transformers • Regulating Transformers • Step Voltage Regulators • Primary Unit Substations • Secondary Unit Substation Transformers • Network Transformers • Series Street Lighting Transformers • Subway Transformers • Industrial Dry Type Transformers • Capacitors • Magnetic Components for Electronics

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MISSOURI AND TORONTO, ONT., CANADA

ALLIS-CHALMERS

DISTRIBUTION TRANSFORMERS

Get These 6 Features

1 High Voltage Sidewall Bushing Has Safety-Designed hand-knob which can't be unintentionally removed, positively prevents touching "hot" parts. No more splicing: connector grips *two* standard conductors as large as No. 2 stranded cable at same time. Conductor can't slip or twist. Use either copper or aluminum wire.

2 Low Voltage Bushing Has Double Key Design to provide positive protection against rotation, eliminate a cause of internal short circuit and maintain effectiveness of seal. Use either copper or aluminum wire. Corprene gaskets are fully retained, are compressed without twist or shear.

3 Tank Bottom Is Recessed with Straight Wall inside and out — there is no place for water to collect. Cover and tank have horizontal gasket surface to assure proper gasket compression with no possibility of shear. Cover clamps are captive, will not drop to ground when loosened. All tanks pressure-tested at 50 psi.

4 Coils Are Locked Firmly with adjustable coil supports. Pad under support distributes pressure evenly. Pad is of specially compounded alkyd polyester impregnated glass fiber for extra strength.

5 Improved Surface Protection because hot spray paint method puts paint, not solvent, on transformers. You get even flow of high content, specially developed alkyd resin enamel that provides a smooth surface with high gloss and thorough coverage.

6 Shipping Crate Provides Pallet as Bonus. After transformer is removed from crate, the pallet bottom can be used for other materials.

A-4773

See these advantages for yourself in Allis-Chalmers Visualizer kit. Your nearby A-C office representative can show it to you. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

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